THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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ORDER OF THE DAY.

1. Report of Gérant.
2. Report of Committee of Surveillance.
3. To declare Dividend.
4. On General Business.

JAMES SHEPHERD, Gérant.

Rome, Sept. 1, 1858.

COMMERCIAL GAS COMPANY. NOTICE is hereby given, that the next ORDINARY MEETING of the above Company will be held at the London Tavern, Bishopsgate Street, in the City of London, on FRIDAY, the 8th day of October next, at Twelve o'clock at noon precisely, to receive the Report of the Directors, and to declare a Dividend to the 30th day of June last.

The Books of the Company will be closed for the Transfer of Shares from the 23rd day of September to the 8th day of October now next ensuing.

By the Company's Act of Incorporation Shareholders can inspect the Books of the Company fourteen days previous to the Meeting.

By order of the Board,
G. JAQUES, Secretary.

Stepney, Sept. 11, 1858.

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The terms of contract may be obtained on application to the Company's Superintendent and Engineer, at the Works, Scalcoates, Hull, and offers will be entertained for the make at either of the above Works, conjointly or separately; but the Directors do not bind themselves to accept the lowest or any Tender.

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Wet Gas-Meters Repaired and Reconstructed with J. Meacock's Modern Improvements.

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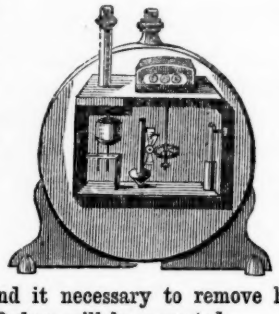

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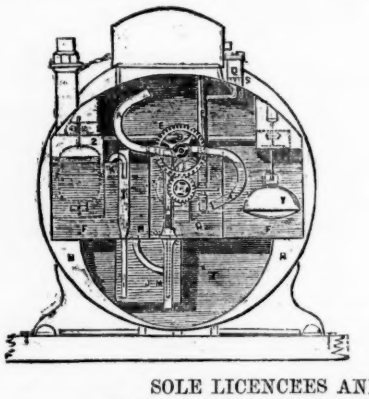

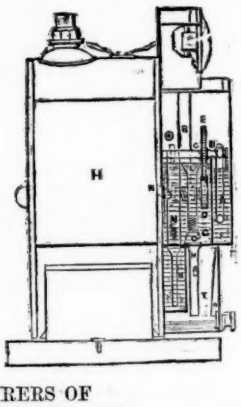

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C. and Co. continue to manufacture ordinary WET METERS of the very best description, Mr. W. Crosley having been for many years the principal and confidential assistant of his relative, the late Mr. Samuel Crosley, of Cottage Lane, City Road, up to the time of his decease, in which capacity he communicated to W. C. the secret of the mixture of the metals which has rendered the Crosley Meter so durable and superior to all others, as is evidenced by a large number of them being still at work after having stood the test of nearly a quarter of a century's use.

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NOTICES.

The subscription is 15s. per annum, if paid in advance during the month of January, or 18s. credit, in two sums of 9s. each, in July and January of each year. Post-Office orders must be made payable at the Charing-Cross Money-Order Office, to William H. Bennett, No. 42, Parliament Street, Westminster.

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All Communications to be addressed to the Editor, No. 42, Parliament Street, Westminster; and orders for Advertisements to the Publisher, Mr. W. B. King, No. 11, Bolt Court, Fleet Street.

THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 28, 1858.

NOTES UPON PASSING EVENTS.

In our last number we alluded with bitter regret to the facility with which scientific evidence, as it is called, can be obtained in favour of any cause; but during the interval between the publication of that number and of the present one a case, which we cannot but regard with a deeper feeling akin to shame, so far as the honour of the Engineering Profession is concerned, has taken place. It appears that, in the course of the operations now going on for the conversion of Loch Katrine into a reservoir for the town of Glasgow, it has been necessary occasionally to submerge about 14 acres of the property belonging to a certain Mr. McGregor, of Glengyle; and the case to which we allude has arisen in consequence of his claim for compensation. Now, the value of the whole Glengyle estate, which has an area of about 15,000 acres, is such that it is only rated for county purposes at £220 per annum. It may be assumed that this rating is far below what it really should be, and also that the recent opening of the railway to Callender has greatly enhanced the value of the estate for building purposes. The Glasgow people, moreover, have taken possession of the 14 acres in question, compulsorily, and therefore they ought to pay a very full price for the annoyance, or interference with other projects, they thus create. But Mr. McGregor has positively asked no less than £93,500 for the 14 acres, taken out of an estate of 15,000 acres, valued for rating purposes at £220 a year! and he has found professional men of standing and reputation to assist him in the attempt to substantiate the claim!

It is, we fear, on account of the want of high moral principle which such unaccountable advocacy appears to indicate, that professional and scientific men do not in our country enjoy the social influence to which their talents would otherwise entitle them. Some time since the Parliamentary Committee of the British Association were disposed to urge upon Government the claims of Science to official favour and recognition; and even in the course of last week Professor Owen brought again into notice those claims. At the former period, as now, we endeavoured, as far as it lied in our power, to repudiate anything like State patronage, or care for the profession which we have ourselves followed; and lengthened reflection has only convinced us more thoroughly that the amount of consideration, and respect, scientific or professional men can command is that which they themselves merit. Holding this opinion firmly, it must be equally a matter of regret to us to witness the indifference with which causes notoriously unsound are supported by men who would scorn to adopt, in their own behoof, the measures they do not hesitate professionally to countenance. It is not by the creation of Professorships, or of well-paid Chairs of Philosophy, that science can become an object of respect to our Mammon-worshipping age, if the parties for whom they are established continue, as at present, to sell their advocacy to the highest bidder. Respect must be won; it cannot be bought, nor can it be created at once by the nomination to places of eminence—or, perhaps, the Board of Health might have conferred titles of that enviable character.

And here we cannot but express our sincere regret that Professor Owen should still continue to hold by the exploded engineering follies and extravagancies of his former colleague on the Commission for Inquiring into the State of large Towns. No doubt it is unpleasant to awaken from a long dream of Arcadian felicity, such as Mr. Chadwick seems to have inspired into the mind of the great Palœontologist; but the visions of pure water collected from pot-piped gathering-grounds, and of fields quadrupled in their productiveness by the distribution of the town sewerage removed by self-cleansing tubes, have been so rudely belied by the results of actual experience, that it is almost incredible that able men—such as Mr. Owen really is, in his particular walk of science—should at the present day avow their belief in the fancies upon which those visions were supposed to be based. Can it possibly be that Mr. Owen has not heard of the failures of the most notorious attempts to obtain a supply of water in the manner he so ignorantly praises—of the Rugby and Sandgate waterworks, we mean? Has he never heard of the Croydon epidemic, or of the somewhat fierce discussions at Ely as to the real value of the works there executed, so far, at least, as the official sanitary engineers were concerned? There is, unfortunately, a strange amount of deference to authority amongst the English, and the assertions of a man so deservedly esteemed as Professor Owen have, therefore, great weight. It behoved him, under such circumstances, before he descended to the contemptible trick of stigmatizing the opposition to the theories he advocated, to assure himself whether or no those theories were based upon any substantial grounds. Evidently, he has not studied the history of Sanitary Engineering of late years, or he must have known that gathering-grounds, self-cleansing sewers, and the other nonsense of the Chadwickians, had only involved the towns where they had been applied in disappointment and loss. Professor Owen has, in fact, in this matter only committed himself to the advocacy of an exploded folly, and added another illustration to the adage, "*Ne sutor ultra crepidem.*"

On the whole, we are just at present rather disposed to quarrel with all official science. For instance, there is our friend Dr. Letheby coolly telling the public that the London Gas Companies lose a fabulous quantity of gas in consequence of the bad joints of their pipes! There is another of our friends, the Registrar-General, in a strange state of bewilderment because the people of London do not die in average numbers, he forgetting the while to make any allowance for the marked diminution of the population which takes place in the early autumn, and which is, perhaps, greater this year than it usually is. Then Mr. Simon has been forcing the statistics, drawn up to order, to assist him in the task of proving the necessity of a Minister of Health—a new red-tape functioneer, with whom, according to the Ministerial journals, we are threatened. It is strange that such shallow wordiness as is contained in the reports of the men thus referred to should be trumpeted forth as "almost eloquent" expositions of scientific facts; stranger still is it that the public and the Legislature should implicitly adopt the false theories, the costly and mischievous crotchets, of these misplaced enthusiasts. We use the word *misplaced* advisedly, because there can be no doubt but that the observations of Drs. Simon, Letheby, and Farr, have been of service to the cause of Sanitary Science, if only from the mere fact of their containing many statistical documents which could not otherwise have been obtained; and, if an undue importance had not been attributed to their opinions, they would unquestionably have rendered great benefit to their fellow-citizens. The evil in these cases lies precisely in the tendency of our nation to accept without question the bold assertions of men occupying prominent positions; and in no instance has this evil been more

fatally apparent than in the so-called sanitary movement of late years. A clique of newspaper writers and of medical men without practice have succeeded in getting up a cry, and lo! all England is frightened out of its propriety to such an extent as to allow its ancient municipal government to be sacrificed to make places for new Ministers of Health! Why do not these new Reformers at once propose a Minister of Food? surely good meals are the first conditions of health; and, on the "circulation" principle, they ought to be included in the intended legislation. *Surgit amari aliquid!* The story of the Andover Union, however, here rises—Nemesis-like.

The London manufacturers in the course of last spring made a species of galvanic movement against the capricious, vexatious tyranny of the Smoke Nuisance Abatement Act, but nothing seems to have come of their organization. They will, however, need to bestir themselves vigorously, if they desire, not protection, but merely justice. In the last number of "Tait's Magazine" there was an article upon the Scotch and the Metropolitan Smoke Acts, which goes to prove that the alarmists are disposed rather to extend the iniquities of the latter measure than they are to recognize the very fair provisions of the former. In Edinburgh, moreover, there is now on foot a great excitement against the so-called trade nuisances; but, alas! there does not seem to be much anxiety to cleanse the wynds, or the densely-peopled parts of the "gude town." The fact is, that the large manufactories are few in number, and very patent; whilst the private parties who create the evils under which the densely-packed labouring population suffer, are not only numerous and obscure, but they are also amongst the influential class of voters. There is political capital to be made by an attack on large manufacturers; a reputation for philanthropy to be obtained thus, easily, and at other people's cost. So the manufacturers must be prepared for a crusade, both in Scotland and in England, we think; and the sooner they also prepare for their own defence, the better it will be for them. At Liverpool there will, no doubt, be an outpouring of the phials of sanitary wrath, and the usual unscrupulous perversion of facts to support the views of the itinerant place-hunters who have already done such mischief. Will the manufacturing interest be enlightened enough to ensure a proper representation of itself at the forthcoming meeting of the Association for the Advancement of Social Science—or, as we translate the latter words, for the diffusal of *doctrinaire* humbug? The Water Companies would do well likewise to bestir themselves; for the British Association seems disposed to trouble them,—and certainly the recent agitation of the rating questions on both sides of the Tweed would indicate a necessity for something like a combination on the part of the Companies for their own defence. Some people appear to believe that the remedy to the present state of uncertainty in the law of rating is to be found in a new Act of Parliament: but the recent experience of the value of empirical legislation in other matters is not sufficiently encouraging to allow us to indulge in hope of any good from such intervention. At any rate, it behoves the Companies to watch narrowly the course of the Legislature in this particular business, which must inevitably be forced upon its attention within a very short period. In the meantime, we would urge the legal advisers of both Gas and Water Companies to observe what is taking place at Leicester and at Edinburgh, at Leeds and at Liverpool.

Before quitting the subject of the peripatetic Societies for the Diffusion of Science—or of error—we would remark that a Dr. Strang, of Glasgow, has lately been indulging the world with some erroneous statistics about the cost of various water supplies. He gives, amongst other incorrect data, a table showing in one of its columns the daily supply for every pound expended; from which it would appear that the inhabitants of Paris receive 33 gallons for every such pound, whilst the inhabitants of London only receive about 11½ gallons: but he coolly adds, that in his calculation he does not take into account the cost of the Canal de l'Ourc. Now, as about three-fourths of the water supply of Paris precisely comes from the Canal de l'Ourc, the comparison in this case is simply a fallacy; and we are convinced that a close analysis of the other articles in the table referred to would lead to a similar result. Will Middle-Class Examinations induce a more logical style of reasoning amongst the lovers of science? It is a consummation devoutly to be wished!—especially as there is, amongst both the learned and the unlearned public, a strange amount of ignorance of the important commercial and scientific questions connected with the water supply to towns. The discussion which took place at Leeds upon the reading of Dr. Lindsay's paper "On the Action of Hard Waters upon Lead," displays, indeed, painfully the comparative ignorance under which we all labour with respect to a subject of such vital importance to civilized societies.

Indeed, it would seem that it is necessary, before we go any further with the execution of costly works for municipal improvement, to examine the very elements of the applied sciences which are required in effecting the desired objects. Not only are we ignorant of the conditions affecting the quality of our cisterns and supply-pipes, but it would also seem, if we believe the *Times*, that our Architects are so perversely stupid as to take a pleasure in building places of public resort in such wise as to ensure the suffocation of tens or of hundreds in case of panic. Certainly the accidents at the Surrey and at the Sheffield Music Halls were sad enough; and they might have been, perhaps, avoided. But it is essentially a condition of panics to defy reasonable calculation; and we confess that it appears to us a strange style of logic to abuse English Architects, because they do not adopt a mode of building which could only have been applied by those who were able to dispose of the resources of the whole civilized world. But thus it ever was with newspaper critics, the less they know of a subject, the more boldly do they scatter censure—just as the *Times* has passed its verdict against the Architect of the Sheffield Music Hall, before even the investigation before the Coroner had been concluded.

Two little books have lately been published to which we beg to call the attention of our readers, until we can notice them more in detail. They are, firstly, a rather awkwardly-written, but valuable little treatise on the question of "How to rate a Railway," by Mr. H. W. Cripps; and, secondly, Mr. Toulmin Smith's "Local Government Act, 1858." The introduction and notes to the latter are of the very greatest interest. Unfortunately, they exhibit so gross an illustration of the want of common honesty amongst our rulers, and of the wanton indifference of Parliament to all but party, or rather faction, struggles, that the future prospects of the country must appear very disheartening. It requires a rude faith in the inherent soundness of the representative system—in its strange capacity for producing a balance of errors—still to hold by that system after reading Mr. Toulmin Smith's exposure of the contemptible tricks to which our rulers have resorted in order to smuggle through the disgraceful measure he has so well, so fearlessly exposed.

Our remarks on the bad grammar and bad taste to be observed in the productions of the official scientific school, have procured us the advantage of communications from Mr. Ranger and from Mr. P. H. Holland—the former personally, the latter by a note inserted in our "Correspondence." We can only say, in answer to Mr. Ranger, that if we erred in accusing him of using the word "strata" in the singular, he has only the writers of the Report on the site of the Netly Abbey Hospital to blame. At page 5 (line 17 from bottom) a quotation from some communication by him is given within asterisks, wherein the very fault we object to may be noticed. It is true that at page 67, in Mr. Ranger's own Report, the error does not appear; but surely the error, if error there be in our censure, should not rest with ourselves, but rather with the authors of the published document. As to Mr. Holland, we can only join issue with him in his interpretation of the letter to the *Manchester Guardian*, to which both he and we alluded. We said that he boasted of his having privately waited upon Mr. Cowper. Now, the words of his letter may not bear this literal interpretation, but the gravamen of our charge lies in this,—that Mr. Cowper, at the time Mr. Holland made "a hasty and imprudently-expressed remark to an individual in private conversation," was not connected with the Board of Health, but was actually the chairman of the committee supposed to be judicially investigating the question upon which Mr. Holland thought fit to address him. We may modify the terms in which Mr. Holland's conduct is explained as we may,—and, indeed, we are quite willing to do so, if such a course should please him,—but the fact will remain on record, that Mr. Cowper listened to private communications from him and from others, when his official position ought to have rendered any such proceeding impossible. It is odd, however, that the Board of Health people, who have been so liberal in attacking the motives of their opponents, should now be so sensitive on their own accounts. "*Qui alterum criminis accusat se ipsum intueri opportet.*"

THE BRITISH ASSOCIATION AND THE PATENT LAW.

The unsatisfactory state of the patent law has, for some years past, formed a regular subject of discussion at the meetings of the British Association for the Advancement of Science, and committees have been appointed and re-appointed to consider the matter, and to agree upon some principles to be recommended for adoption in an amended law. The committee made their report to the Mechanical Section on Friday last, and a number of members who are inventors, and have had practical experience of the operation of the present system, took the occasion to unburthen their minds and to complain of the grievances they have suffered.

The report was rather suggestive than recommendatory. It was limited principally to the money view of the question, stating the average number of provisional specifications and patents that have been granted, and the money paid by inventors, and then suggested, interrogatively, what should be done with the surplus that remains after all the expenses of the patent office are defrayed. It was stated that the payments into the Patent Office during the first two years after the amended law of 1852 came into operation amounted to £50,000 per annum; that according to the report of the Commissioners for 1856 they amounted to £83,000 in the preceding year; and it is estimated that when the payments for renewal after seven years begin to be made, the annual receipts will be £100,000. The points suggested by the committee for the consideration of the members of the British Association are, whether it would be better to diminish the fees for patents to the minimum amount that would pay the expenses of the Patent Office, or whether the surplus should be appropriated in some way for the promotion of invention and the protection of inventors, one of the objects suggested being the reward of ingenious inventors who have failed to derive profit by the exercise of their ingenuity. In the discussion which ensued after the reading of the report, the uncertainty that now attends patent rights, and the consequent litigation, were the points most strongly insisted on, but no practical plan was suggested of establishing the one or of preventing the other. The previous examination of inventions by commissioners before granting patents, as is the case in America, was recommended by some, whilst any previous examination whatever was condemned by other speakers; and it was proposed that, instead of the useless forms still retained, the Patent Office should be open for the sale of patents for £5 each to all applicants, without inquiry. The present plan of opposing applications for patents before the Attorney or Solicitor-General was, indeed, shown to be a mere absurdity, and to be liable to great abuse. The fees those learned gentlemen derive from this farce of recommending Her Majesty to grant letters patent amount to about £5000 each per annum; and Mr. Heywood, one of the committee appointed by the British Association, gave a ludicrous description of the uncomfortable anxiety displayed by these officers when he brought in his bill for the amendment of the law into the House of Commons, and of their attempts to count out the House. The Attorney and the Solicitor-General are at present the great obstacles to any reform that may tend to diminish their fees, and they would, no doubt, equally object to any amendment of the law that should require them to earn the money they receive.

The greatest grievance of the existing state of the law of which poor men of inventive genius complain is, that they do not know what has been already done, and after spending their time and their money in perfecting an invention, they find that some one has already claimed the same thing. The publication of specifications has done something towards removing this evil, but working men can scarcely find time to examine the records of the Patent Office, which are so voluminous that it requires an examination of days to ascertain whether any recently-granted patent interferes with a new invention; and, as regards the enrolled specifications under the old law, it would be hopeless to attempt to unravel their mysteries.

The committee and those members of the British Association who took part in the discussion considered the patent law only from the inventors' point of view, and omitted to look at the question in its important bearing on the manufacturing interests of the country. Each inventor was sensitively alive to the annoyance he experienced when he found another inventor in the field before him, but he could not sympathize with the manufacturer, who cannot make the least improvement in his machinery without rendering himself liable to an action at law for the infringement of some patent privilege that may, perhaps, be worthless for the object it was intended to effect. The terrors of the law, indeed, amount to a denial of justice to the poor man, whilst they serve as an instrument of extortion against manufacturers. It was stated by some inventors that they had abandoned what they fully believed to be valuable inventions rather than incur the cost and the hazard of a law suit; and if the other side of the question had been heard, many manufacturers would have made known equally aggravating instances of extortionate demands complied with from fear of being dragged into a court of law.

To give increased facilities for obtaining petty obstructive monopolies—which appears to be the object aimed at by the committee of the British Association—would only increase the principal evils now complained of, and would end, as we have before expressed the opinion, in rendering patent privileges of no avail, except as instruments of extortion to rich patentees. That amendment of the patent law is required all will readily admit, but the alteration suggested by the committee of diminishing the fees would be to plunge into greater difficulties, unless some stringent regulations could be provided for limiting the grant of letters patent to really useful inventions. The opinions of practical men of the injustice and inutility of the present system are strikingly exemplified by some cases, mentioned by Mr. Webster, of inventors who have taken out provisional specifications for the sole object of having their inventions published, so that they may not afterwards be obstructed in carrying them into operation by competing patentees. If the suggestion of the committee to reward inventors from the national funds could be practically carried out, it would present the means of at once solving all the difficulties attending the protection of the productions of inventive genius. But we can scarcely hope either that the nation will be sufficiently liberal to grant the adequate funds, or that any body of men would be at present appointed to whose awards inventors generally would be inclined to submit.

Circular to Gas Companies.

The photometric testing of gas has now become so thoroughly engrafted on our code of regulations for the administration of gas companies, that information on the subject is eagerly sought after in spite of the discredit brought on it by the unskilfulness of some of the early experimenters. The most elaborate paper on this matter which has yet fallen under our notice is an hitherto unpublished report made in 1852 by Professors Brande and Graham, Dr. Leeson, and the late Mr. J. T. Cooper, to the directors of the Great Central Gas Consumers' Company, which was brought before the arbitrators in the course of the late litigation with Mr. Croll, and will be found in another column of our present issue. The deservedly high estimation in which the names attached to this report are held, entitles whatever they may suggest to our respectful consideration; but we are compelled to say that, in our opinion, a great sacrifice of valuable time was made in searching for what has hitherto proved a chimera, viz., a positively uniform standard candle, when the same results might have been obtained by noting the actual consumption of any candle, and the comparative light emitted during an experiment, and from thence deducing, by a simple rule-of-three equation, the value of the gas-burner in candles of any arbitrary consumption per hour. The experiments detailed in the report prove that the best candles are too uncertain in their rate of consumption to permit of their being used as standards in any photometrical experiment where accuracy is desired, without their actual consumption be also determined and taken into account. The document is, however, upon the whole, an able and interesting contribution to our stock of knowledge on this subject, and may be studied with profit by those who take an interest in it. Daily observations upon the quality of this company's gas have since been made by Dr. Leeson and his assistants in the manner therein laid down, and the following is an abstract of the quarterly averages, compared with those of Dr. Letheby and Mr. L. Thompson, in candles of 140 grains per hour. The discrepancies are considerable, and suggest a doubt whether photometry, even when practised by experienced hands, has yet arrived at such a state of perfection as to warrant its being recognized in the statutes of the realm:—

	Dr. Leeson.	Dr. Letheby.	Mr. L. Thompson.
1852—October	11·8	11·5	10·3
November	11·76	10·9	10·5
December.	12·	11·08	10·5

	Dr. Leeson.	Dr. Letheby.	Mr. L. Thompson.
1853—January	11·76	11·57	11· 7
February	11·95	10·85	11· 1
March	11·54	10·92	10· 3
April	11·95	10·67	9·85
May	12·14	11· 5	10·85
June	11·58	11·42	10·88
July	11· 8	11· 8	11· 2
August	11· 4	12·	11· 1
September	11· 9	...	11· 1
October	11·68	11·16	10· 5
November	11· 9	11· 9	11·
December	11·33	10·84	10· 6
1854—January	12·15		
February	12·05	10·97	
March	12· 1		
April	11·39	10·97	
May	11·52		
June	12.		
July	12· 5	11·82	
August	12· 4		
September	12·35		
October	12·	11·41	
November	11·86		
December	12·11		
1855—January	11· 7	11·31	
February	10·79		
March	10·64		
April	11·76	11·26	
May	11·10		
June	10·96		
July	10·59	11· 4	
August	10·65		
September	10·76		
October	11·72	11·09	
November	11· 7		
December	12·02		
1856—January	12·	11·79	
February	12·08		
March	11· 9		
April	11·16	11·35	
May	11·43		
June	11·61		
July	11·22	10·92	
August	11·61		
September	11· 4		
October	11·81	10·71	
November	11·32		
December	11·75		
1857—January	11· 7	11·05	
February	11· 7		
March	11·36		
April	11·32	10·54	
May	11·12		

The dissatisfaction of the metropolitan public at the constant uprooting of the pavements in the principal throoughfares for the construction of sewers, and for the repairs of gas and water-pipes, has at length found an outlet in the columns of the daily papers; and the *Times*, in an able leading article, after exposing the manifold inconveniences to which the public are subjected by the diversion of the traffic from such causes, says—

At last, however, the subject has really attracted official notice, and when the City Commission of Sewers met last Tuesday the court took up the question as if fully impressed with its importance. Mr. Ross did the public the service of introducing the matter. He observed that the street in which he lived had been pulled up three times in one year, and he mentioned the case of another street where the flagrancy of the proceedings was truly extraordinary. The pavement was taken up for the construction of a sewer, and, as the job was a tedious one, the ground remained open for any subterranean work through a period of several months. No advantage whatever was taken of this opportunity, but a year had not elapsed, after the completion of the sewer and the restoration of the pavement, when a gas company appeared, and took all the stones up again. This was bad enough, but Company No. 1 had hardly finished and left a clear street once more, when Company No. 2 followed, and up went the pavement for the third time. Few persons will quarrel with the speaker's conclusion, that "some regulation ought to be made by which companies should be required to do large works of that kind at the same time." In the end, a motion was carried referring the subject to the general purposes committee, and we are perfectly convinced that nothing but the discussion of the question is needed to secure the public interests from these wanton injuries.

The time must come when provision will be made for these and other exigencies by a comprehensive system of sub-ways, which will admit people to their underground business without disturbance to those above; but, until this happy consummation arrives, we must do the best we can, and reduce the unavoidable inconvenience to the least possible dimensions. We must have sewers, and we cannot dispense with water and gas. We are also alive to the general advantages of competition; nor do we desire to see the supply of gas or water in the hands of a single company. These necessary conditions carry with them troublesome liabilities, and the liabilities are rather on the increase than otherwise. More streets and shops are furnished with gas, and more tenements with water, than in former times; sewers are more freely constructed, and the wear and tear of the pavement itself becomes greater year by year. By-and-bye, too, we may have electric telegraphs, or other still more novel inventions, requiring subterranean wires, so that we cannot calculate upon any period of permanent repose. This, however, only renders it more imperative on us to put matters on a good footing as they stand, and to apply such regulations to the practice of street-breaking as will secure us a minimum of annoyance.

The construction of sub-ways in new streets formed the subject of a recent competition, which gave some insight into the difficulties attending their introduction, and stamped the project, as applied to old streets, as perfectly chimerical. Practical people have no faith in the prophecy of the *Times*, that "the time must come when a comprehensive system of sub-ways will admit people to their underground business without disturbance to those above," but they turn rather to the possibility of reducing the cause of complaint to the minimum; and, though our great contemporary is loath to give up the principle of competition in the supply of gas and water, reasonable people have long since seen that it has failed in fulfilling the object for which the *Times* contends, and we do not despair of that influential organ itself admitting the failure. It has already done so in respect to railways; and the last shred of competition between any of the metropolitan gas companies which has provoked the indignation of the City Commissioners of Sewers, ought to convince the most earnest advocate of free trade, that it is impossible in the article of gas.

Correspondence.

CLARK'S IMPROVEMENTS IN GAS-METERS.

SIR,—My attention has been called to a report in your last number of a specification of improvements in gas-meters, the patent for which stands in my name.

According to your report, this patent appears as my property and the subject of my invention, which, as I have been advised and believe, is calculated to create an impression injurious to me in my profession.

Will you kindly allow me to state, through the medium of your forthcoming number, that I have no interest whatever in the patent referred to, or in many other patents appearing in my name, which are all communications from foreign inventors residing abroad, to whom I assign the patents when complete.

W. CLARK.

Patent Office, 53, Chancery Lane, London,
Sept. 16, 1858.

THE MANCHESTER CORPORATION AND THE SANITARIANS.

SIR,—My attention has just been called to a sentence in your article of the 14th instant, in which it is stated—"In one of the recent numbers of the *Manchester Guardian* we find, indeed, that Mr. P. Holland has actually boasted of his having privately waited upon Mr. Cowper, the president of the committee which decided against the scheme submitted to Parliament last session by the Manchester corporation, and made to him statements of a very extraordinary nature."

I wish to inform your readers that my letter to the *Guardian* contains no such boast, nor do I say that I privately waited on Mr. Cowper; on the contrary, the statement referred to in it, which has been misrepresented in a very extraordinary manner, was made in Westminster Hall, in the presence and in reply to an alderman of the corporation, who, as such, was a party interested in the bill.

The whole of the conversation referred to, that I remember, consisted of a remark by the alderman alluded to, a hasty and imperfectly-expressed reply by me, and a smile and a "Good morning" from the chairman as he walked away. I don't think any of the three to blame, either the gentleman who made the first remark, nor I who answered it; and certainly not Mr. Cowper, who walked off. It did not occur to me to boast of this. In short, the whole sentence I have quoted from your article is a gross misrepresentation of my letter to the *Guardian*, as every one who will read it may see.

P. H. HOLLAND.

4, *Old Palace Yard, Westminster,*
Sept. 16, 1858.

Register of New Patents.

537.—PHILLIP LE CAPELAIN, of Blackfriars Road, in the co. of Surrey, gas engineer, for "*Improvements in dry gas-meters.*" Patent dated March 16, 1858.

The meter is arranged with three or more measuring compartments, each compartment having an inlet and an outlet-passage communicating therewith, whilst each passage is provided with a separate valve; so that there is an inlet-valve and an outlet-valve to conduct the gas to and from each compartment. The valves used are of the lever (or what the inventor calls flute-key) kind, but the hinged ends thereof are free to admit of the valves resting fully on their seats, whilst the other ends are operated by rods from cranks or eccentrics (one to each valve-rod) upon an axis caused to rotate by connecting-rods from lever-arms attached to the axes of motion of the movable diaphragms. The inlet-valves are in a chamber separated from the outlet-valves.

Each of the rods from the cranks or eccentrics to operate the valves is, during parts of the revolution of its crank or eccentric, moving without operating its valve, the valve at such time being closed upon its seat. The lever-arms, from the axes of motion of the diaphragms with their connecting-rods to the axes of the cranks or eccentrics, are in a chamber separated from the gas.

When three measuring compartments are employed, a fixed partition is not required.

Suitable indicating and registering apparatus is employed, as is well understood.

The claim is for the arranging and combining the parts forming the valves of dry gas-meters substantially as explained.

545.—Thomas Chambers Hine, of Nottingham, architect, for "*Improvements in lighting and ventilating by gas.*" Patent dated March 17, 1858.

For these purposes a series of horizontal flames of gas are used, produced by ordinary union-jets or batswing burners attached to a ring in a horizontal position, and over this ring is placed a dome of glass or other translucent material (of somewhat larger diameter than the ring), from the summit of which passes a pipe, through which the products of combustion are conveyed out of the room to a chimney or some other convenient place. The lower part of this dome may be closed by a disc of glass, or the metal rim, being sufficiently perforated for the admission of air from the room, for supporting combustion and carrying on ventilation. On the outside of the horizontal portion of the combustion or ventilating-pipe, another pipe is used of larger diameter, and through the annular space between these two pipes fresh air is conducted into the room by a continuation of the larger pipe to the external air, and is discharged at the ceiling over the vertical pipe, or at some other convenient part of the room, after having become warmed in its passage in the annular space between the two pipes. Where an increase of heat is required, the patentee purposes continuing the annular tube down the vertical position of the combustion-pipe, and admit the warmed air into the room at its lower extremity, a short distance above the summit of the glass dome.

561.—Alexander Angus Croll, of Coleman Street, in the City of London, engineer, for "*Improvements in the manufacture of dry gas-meters.*" Patent dated March 18, 1858.

In forming the valve-seats of dry gas-meters it is usual for the width of the bars or divisions between the passages or openings through them to be about equal to the width of such passages or openings; but, by the extent of surfaces thus in contact with the valve or cover, it is found that fluid condensed or formed from the gas accumulates between such surfaces, connecting them, or causing them to adhere together; and that during part of the motion of the valve, the passages become partially closed by a sort of film produced by such condensation thus adhering to the parts of the valve and the edges of its seat, so as to obstruct the free passage of the gas, which thereby becomes irregular in delivery, producing flickering or oscillation of the lights; and to remedy this evil constitutes one part of the present improvements. For this purpose, in constructing the valve-seats of dry gas-meters, where the valves or covers slide uniformly to and fro over every part of such seats, the inventor reduces the width of the surfaces or bars between the openings in the valve-seats considerably, and retains only such portion of those surfaces as is necessary to secure the due measurement of the gas; and, by preference, he forms the centre opening, or that for the exit of the gas, larger than the others.

Another improvement relates to the composition of the alloy employed in the manufacture of valves or covers, and the valve-seats of dry gas-meters. The alloy generally used for these purposes consists of nearly equal parts tin and antimony, and the patentee has found a great advantage to result in the working of such parts by adopting an alloy for the valve-seats, in the composition of which tin predominates considerably,—say to 6 parts of antimony he applies about 16 parts of tin, or thereabouts, and for the valves or covers say about 8 parts antimony to 16 of tin. But the inventor finds it important in all cases that there be a difference in the composition of the alloy for the seats from that for the valves or covers, as thereby the friction of the surfaces in contact is materially lessened, and the action of the meter rendered more regular and certain.

In forming the alloys it is found important to heat the tin and the antimony separately before mixing, and, whatever the proportions adopted, to combine them at two different times.

Thus, supposing a composition is wished for formed of 8 parts antimony and 16 of tin, the inventor melts fully 8 parts of antimony (say to a blood red heat) in one crucible, and 8 parts of tin in another crucible, and when both are ready he mixes them, and having stirred them together, he pours the compound thus obtained into moulds or ingots. This composition he again melts, as also the remaining 8 parts of tin (separately by preference) and having mixed these, he pours the compound obtained into moulds ready for use.

The patentee says that he does not confine himself to the precise details referred to, so long as the peculiar character of either part thereof be retained substantially as explained.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

1978.—Alfred Vincent Newton, of 66, Chancery Lane, London, for "*An improvement in gas-burners.*" A communication. Aug. 31, 1858.

2020.—James Fyfe, of Greenock, in the co. of Renfrew, N.B., brass-founder, for "*Improvements in stop-cocks or valves.*" Sept. 7, 1858.

2030.—John Farmerly Dickson, of 6, Russell Street, Litchurch, near Derby, in the co. of Derby, engineer, for "*Improvements in the construction of taps, cocks, valves, hydrants, and other apparatus for regulating the flow of water and other fluids.*" Sept. 8, 1858.

2063.—Frederick Giesbers, of the Great Central Gas-Works, Bow Common, Middlesex, for "*Improvements in the manufacture of coke.*" Sept. 11, 1858.

2073.—Jean Baptiste Adolphe Dugléré, of Paris, for "*A new method of separating solids from liquids for disinfecting purposes.*"

2087.—Alfred Hope John Bastable, of Belgrave Works, Ranelagh Road, Pimlico, London, for "*Improvements in apparatus employed in the production of light.*" Sept. 14, 1858.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

1029.—Robert Best, of Birmingham, in the co. of Warwick, manufacturer, for "*An improvement or improvements in illumination.*" May 7, 1858.

1082.—Hiram Hyde, of Truro, Nova Scotia, gentleman, for "*An improved mode of, and improved apparatus for, manufacturing oils.*" May 13, 1858.

1138.—William Clark, of 53, Chancery Lane, London, engineer and patent agent, for "*Improvements in the processes of treatment of peat, and of the hydro-carburets it contains, and in the apparatus for the same.*" A communication. May 21, 1858.

1187.—James Stuart, of Sly Kate's Hill, Chatham, Kent, for "*An improvement in distilling asphalte, pitch, tar, and other bituminous substances.*" May 28, 1858.

2037.—Alexander McEwan Peters, of Edinburgh, N.B., plumber, for "*Improvements in apparatus for regulating the flow or passage of fluids.*" Sept. 8, 1858.

Legal Intelligence.

WOOLWICH POLICE COURT.

THURSDAY, SEPT. 23.

THE WOOLWICH EQUITABLE GAS COMPANY AND THE THAMES CONSERVANCY COMMISSIONERS.

Mr. *George Crisp*, the secretary of the Woolwich Equitable Gas Company, appeared before Mr. Traill this day to answer an adjourned summons, obtained at the instance of the Thames Conservancy Commissioners, which charged the company with having, on the 26th of August last, allowed certain offensive matter, being the liquid refuse proceeding from their works, to flow into the river off Harden's Lane, Woolwich, contrary to the Act 21 and 22 Victoria, entitled "An Act to provide for the conservation of the river Thames, and for the regulation, management, and improvement thereof."

On the first hearing, Mr. Stuchbury, who appeared for the commissioners, said that his clients had hoped that the numerous prosecutions of this kind which they had instituted would have had the effect of putting a stop to such nuisances as the one now complained of, and thus rendered further proceedings unnecessary. But frequent and urgent complaints had been made to the commissioners that such was not the case, and that the nuisance caused by the flow of gas-water from the different works into the Thames still continued, and it had been proved on many occasions that this liquid was far more noxious and injurious in its effects on the river than the discharge of sewerage into it. Information had reached them that it was the practice of the defendant's company to discharge such refuse from their works into the Thames, and on the 26th of August they employed a waterman to inspect the works, where they found a large quantity of the offensive fluid flowing from a brick shute in the centre of the company's wharf, and therefore the present summons was taken out.

Thomas Wokings, a waterman, deposed that in consequence of directions which he received to watch the works of the Woolwich Equitable Gas Company, he went there about midnight on the 26th of August. He observed there a 12 or 15-inch brick shute in the centre of the wharf, and another of a similar kind above the company's premises; which latter, however, he did not consider had any connexion with the works. The tide was at about half flood, and there was flowing from the centre shute a stream, about three inches in depth, of a liquid with a most offensive smell, which he recognized as gas refuse. A few hours after he found the flow of liquid still the same. The fluid running from the other drain was not so offensive. He procured and bottled samples of the fluid which came from each, which he now produced, together with a tin can which he had used to obtain the fluid, and which showed a black deposit from the liquid it had contained.

The Secretary of the Company (Mr. G. Hudson) said the prosecution was founded entirely upon a mistake; for the fact was, that this brick drain was a parish sewer, passing down Harden's Lane, and through the company's premises, but there really was no inlet into it from their works. The liquid which flowed from the drain was sewerage, and that in the bottle produced was the same.

Mr. Stuchbury said he had summoned Mr. Hudson to give evidence for the prosecution, and wished to call him as a witness.

Mr. *Hudson* having been sworn deposed that he was thoroughly acquainted with the premises of the company, and the operations carried on there. The refuse liquid resulting from the manufacture of their gas was collected in tanks, and sold by contract at so much per hogshead, and none of it was allowed to flow into the drains, with the consent or knowledge of the directors, or of their engineer.

Mr. *Crisp* corroborated this statement, and said that there was a small stone sink in the yard which might be connected with this drain, but it was only used for the purpose of surface drainage, and he was positive that the gas refuse was not conveyed in that way into the sewer.

Mr. Traill said it would be necessary for the prosecution to prove either that the defendants had a communication between their works and the sewer for the purpose of carrying off the refuse, or that the liquid flowing from the drain was gas liquor, so that it would be reasonable to conclude that it could come from nowhere but the gas-works.

Wokings said he had had fifteen years experience in these matters, and he could swear that the liquid was gas-water.

Mr. Traill said this was not sufficient. He suggested that Mr. Stuchbury should go down with the engineer and inspect the works.

Mr. Stuchbury argued that the case was sufficiently proved, for it had been admitted by the engineer that a connexion existed between the drain and the surface of the works.

Mr. Traill said he was not in a position to decide the case, and should adjourn it for more conclusive evidence.

Mr. Stuchbury said it was folly for the company to dispute the fact, for they must know that their refuse was carried off by this drain.

Mr. Grisbrook said, as chairman of the company, he would most positively deny this.

Mr. Hudson proposed that the case should be adjourned, in order that Mr. Stuchbury might inspect the works, and Mr. Traill then ordered the case to stand over until Thursday last.

At the adjourned hearing Mr. Sleigh appeared for the Conservancy Commissioners, and the following evidence was called:—

Dr. *Letheby* deposed that he was professor of chemistry in the London Hospital. He had made an analysis of the contents of the bottles produced, and found them to contain large quantities of sulphuretted hydrogen and ammonia, clearly indicating them to be the refuse of gas-works. There was also present a peculiar compound characteristic of gas liquor, viz., the sulpho-cyanide of ammonium, which was very prejudicial to life and health. He had examined the sediment upon the tin can, and found it to be coal tar, also the refuse of gas-works.

The witness *Wokings* was recalled by desire of Mr. Crisp, and in cross-examination stated that he saw no deposit of coal tar on the edges of the drain.

Dr. *Letheby*, in cross-examination, said the water which sometimes came from the syphons in the street was of the same nature as this fluid, but he did not think that that in the sewer was likely to have come from that source, as it was never discharged in large quantities. There was sewerage in the fluid he had analyzed.

For the defendants, Mr. *Barnett*, surveyor to the Local Board of Health, was called. He stated that, in consequence of an application made, he had been instructed by the local board to examine this sewer. It ran down Harden's Lane, receiving the house-drainage and contents of the gully, and then passed through the works of the company into the river. He had examined the works of the company, and the only communication with this drain which he found was a small sink in the yard, apparently only used to carry off surface water. There was no appearance of coal tar round the edges of the sink, nor at the mouth of the sewer. He had been instructed by the board, at the desire of the company, to report on the practicability of diverting this drain so that it would not flow through the works at all. He could not say whether it was or was not possible for the manufacture of gas to impregnate the surface water, and make it smell like that found in the sewer.

Mr. *Henry Bland* was then called, and said he was clerk to the gas company, and had been so employed for nine years. He was thoroughly acquainted with the premises. The gas refuse was always collected in tanks and sold. He was certain it was not discharged into this drain. He knew this drain, and he was positive that there was no other connexion with it than this sink, which was only used to carry off the waste from a cistern of pure water.

In reply to Mr. Traill, Mr. Barnett said the drain might be diverted within a fortnight.

Mr. Traill said he thought that that would be the best way of settling the matter. He should make an order for the full penalty of £20, with the understanding that if within fourteen days the drain was diverted and the nuisance was removed, such penalty should be reduced to the amount of the costs in these proceedings.

IN THE ARBITRATION OF THE GREAT CENTRAL GAS CONSUMERS' COMPANY AND MR. ALEXANDER ANGUS CROLL.

(*Continued from page* 554.)

SIXTEENTH DAY—*continued.*

Thomas Dakin, Esq., examined by Mr. Lloyd.

I am now, and have been since February, 1850, chairman of the company.

By the Umpire: I was an original subscriber.

By Mr. Lloyd: And as an original subscriber I took great interest in the matter. I conducted the battle before the Commissioners of Sewers and the Court of Common Council, and took a very leading part in it, and had constant communication with Mr. Croll in the early part of the formation of the company. Until the middle or end of 1856 I never understood from Mr. Croll that he had any claim on the company in respect of services rendered by him in the formation and establishment of the company, and for evidence given before Parliament, and then only in general terms. I never knew any specific claim or for what object. It was never intimated to the shareholders that there was a claim of that kind; on the contrary, in the making out of the balance-sheets and declaring the dividend, I have shown that all the assets and liabilities of the company have been fairly stated, and on that the dividend has been declared. My statement has always been the reverse with regard to the illuminating power, which was only to become payable under the contract when they received the 10 per cent., which contingency was always stated to the shareholders, and that was a possible contingency which I could conceive would arise. I may mention, in October, 1856, when it was notorious that the relation between Mr. Croll and the company was about to cease, that one of the shareholders at the meeting in 1856 did ask me whether it was true, as reported, that Mr. Croll had a large claim on the company; and, Mr. Croll being present, I got up and said I was very glad that question was asked, because it enabled me to state that Mr. Croll had been settled with, since the formation of the company, quarter by quarter. He never had made any claim against the company, and had no claim, and had been a party on all occasions to making the dividends, and the statements of the accounts, and I could not conceive it possible he had any claim. The meeting passed off, and a vote of thanks was about to be passed, and then Mr. Croll got up and said that, as I had stated that, and his silence might bind him if he had any claim, when the proper time arrived it would be made out; and that was the first time I had any intimation of it. The reports for the general meetings have been submitted to Mr. Croll, and on none of those occasions when the report has been discussed at the board-meeting has he intimated that he has had a claim of any sort Mr. Pearson never intimated to me that Mr. Croll had laid before him a claim of this kind. I heard from Mr. Pearson, in the year 1855, a statement of the alleged loss; but I never heard the slightest whisper of any kind of any claim that Mr. Croll alleged that he had against the company. When he said he had sustained a loss, I said he was concerned with the company under a special contract, and with regard to his loss or gains I had nothing to do. In truth, I did not believe the fact of his loss. Mr. Croll was engineer for the construction of the works, and on those works he has been paid between £7000 and £8000 as constructing engineer. The calculation was made at the time of 5 per cent. on a given sum, for which he had about £5000; and, on the extension of the works afterwards, he was paid a further sum of £2000. The large mains for the supply of the increased consumption in the City were, I believe, laid in 1853. We lighted the public lamps in 1852, and from 1853 to 1856. I have a perfect recollection of the arrangement with regard to the 20 per cent. for leakage and loss. It was entirely grounded on the difficulty we found in estimating correctly the quantity of gas that would pass from the station-meter. With reference to the increase of volume by temperature, it was considered a matter of so much importance that we referred it to Dr. Leeson, who was the chemical adviser of the company; and in October, 1850, Dr. Leeson made a very comprehensive and precise report to the company, as to the effect of temperature increasing the volume. [The report was handed to the witness*.] This is the report of Dr. Leeson, and I recollect that it was of so complicated, unworkable, and unmanageable a nature, that the board were very glad to accept Mr. Croll's offer on that, and to have a definite payment taken at the consumer's meter. That was the entire reason why the company varied the price of 1s. 4½d. to 1s. 9d. taken at the consumer's meter; and it was to embrace the whole unaccounted-for gas. During the time that I have been chairman, I have never known complaints made by Mr. Croll as to the conduct of the officers of the company in any way. He was in that position with regard to the company, that any complaint or suggestion that he made with regard to the management and conduct of the company would have had the immediate attention of the board. I have seen the claim that has been made for unaccounted-for gas. The first idea I had of any claim at all was, I believe, in a letter or a communication in July, 1856; but then I believe it did not take any definite shape. It was a general claim. We had a number of complaints in that month—in July, 1856—of the pressure and of the quality of the gas, which resulted in a very serious disturbance of the business of the company, and we had a special board to consider it, and a communication was opened with Mr. Croll on the subject, and then it was for the first time that he said he claimed it. I remember the contract for the public lighting in 1853. Mr. Croll never complained to me of the terms of the contract; he was desirous to obtain the public lights. When the accounts were sent in of the receipts for the public lighting, no objection was made. It was settled in the usual manner at the end of each month, and payment at the end of each quarter. There was adjustment between his clerk and the clerk of the company. I remember the last contract for lighting the City, in 1856; Mr. Croll, I recollect, wrote a note to the board, I think in the month of February, in which he said that he was going to Constantinople; and during his absence the time arrived for giving in the tender for the supply of the public lights. I had no communication with Mr. Rait on the subject, but he expressed his anxiety to Mr. Pontifex that we should not lose the public lights. I remember a vote of thanks being passed to Mr. Croll in 1851, after he had undertaken to remodel the office. In the course of that early period, we, as directors, had a very slight knowledge of the machinery and necessary arrangements of a company like ours, Mr. Croll being the promoter, and being the man that was always looked to in these matters. At the commencement, I believe, he volunteered to arrange the duties of the inspectors and remodel the office; and at the close of that, when he made a report, I believe in February or March, 1851, the board then passed a vote of thanks to Mr. Croll for his services, and if I remember right, at the same time something like a loan was made to Mr. Croll. I have not the slightest recollection of having said to Mr. Delane, who moved the vote of thanks, that Mr. Croll would expect something more substantial, and I think it is exceedingly unlikely that I should have made such a remark. I remember the report by Mr. Pontifex, with the scale of pressure, on the 28th of December, 1855. It was handed to the board, Mr. Croll being present, and he undertook, without any protest, that we should have the pressure. We had a serious complaint from a large consumer with regard to a deficiency of light, and from want of pressure. I put it to our chief inspector that he should give a report, stating the pressure requisite to carry on the business of the company. That report was handed in by Mr. Pontifex, and handed to Mr. Croll, in order that he might be informed what we required, and he undertook to give it. I remember a report being handed in to the board in April, 1852, as to remodelling the contract with regard to the illuminating power, because I have a very precise recollection of what led to it. I do not think it has been alluded to here; and I think, for the information of the arbitrators, it should be known that, during the year 1851, there had been some dissatisfaction with regard to finishing the contract with Mr. Croll and the company; and at one of those meetings, at which Mr. Bower was present with Mr. Hardwick for the first time, we had a statement made by Mr. Bower with regard to the insufficiency of the contract made with Mr. Croll to supply the necessary gas for the company. I was empowered by the board, in company with our solicitor, to see if we could not arrange the terms of the contract satisfactorily between Mr. Croll and the company; but directly Mr. Bower opened that view of the case, I directly said I had no instructions with regard to any interference with the contract; that my instructions were simply limited to carry out the contract, if possible, by a proper deed. I found there was a dissatisfaction on the part of Mr. Croll towards carrying on the contract; and, in company with Mr. Bovill, I went to Birmingham to see Mr. Clift, engineer of the Birmingham and Staffordshire Gas Company, who was desirous of taking our contract. On that occasion, Mr. Clift made a tender to the board (which was under consideration) to supply gas the same as Mr. Croll, altering the illuminating power from 9½ to 12 candles of 140 grains sperm; and he was in town, prepared to execute a contract based on that tender; and it was at that time that the letter emanating from Mr. Croll and Mr. Pearson was delivered to the board. I remember the letter being handed in by Mr. Pearson at the board-meeting on the 29th, but I do not think it was read at that meeting; but the condition of the letter varying Mr. Croll's contract as to the illuminating power, was incorporated in the report that was read to the shareholders on the 30th.

By Mr. Archibald: I can swear most positively that Mr. Croll was present at the meeting of the 30th, and was conversant with that report. He heard it read to the shareholders, and he knew the effect intended to be produced on the shareholders, and which was produced on the shareholders.

By Mr. Lloyd: No account has ever been presented for payment of the extra illuminating power, because the claim could not arise until the shareholders had been paid 10 per cent. On the last occasion we had an accumulated balance of the former years over the 8 per cent. We could have made a larger dividend at the last meeting, if we had considered it prudent; but seeing the large expense we were likely to be put to, we thought it prudent to keep back a considerable balance, and I am afraid that the existing capital of the company will be insufficient to pay the large expenses we have incurred, and we shall have to make a call for fresh funds. In the proposal of the 29th of April, the question of the illuminating power is to be referred to Professors Brande, Cooper, Graham, and Dr. Leeson, to define the standard to carry out the actual illuminating power by experiment. It was referred to them, and they made a report on the 1st of July, 1852. Under that arrangement, these gentlemen were to appoint a chemical referee to take the illuminating power, under the system named in their report, and they appointed Dr. Leeson, and we have his reports up to the period of the termination of Mr. Croll's contract in July, 1857.

The following reports were then handed in:—

To the Directors of the Great Central Gas Consumers' Company.

London, July 2, 1852.

Gentlemen,—In compliance with your resolution of the 25th ult., I have the honour to transmit the accompanying report of Professors Brande and Graham, J. T. Cooper, Esq., and myself, in answer to the questions proposed for our consideration, and am,

Yours obediently,

H. B. Leeson.

Questions proposed.

1. What sperm candle do they recommend to be used for the purpose of testing daily the gas of the company?
2. What instruments do they recommend to be employed?
3. What conditions do they recommend to be adopted in taking the observations, having regard to atmospheric temperature, current of air, time and mode of burning the candle, or other circumstances calculated to affect the experiments?
4. The object of this reference is to obtain the most certain and just practical means of measuring the illuminating power of the gas to be supplied to the company by Mr. Croll, which is to be paid for by admeasurement according to the standard they may recommend in their report. (Signed) Thomas Dakin, Chairman.

Report.

First, in reference to the spermaceti candles to be adopted in testing daily the gas of the company.

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* This report appeared in the Journal for March 16, page 152.

We understand that in pursuance of a report on the same subject some time since addressed to you by Professor Graham and Dr. Leeson, your contract with Mr. Croll is based upon comparison of a spermaceti candle, of the description termed "short sixes," and consuming at the rate of 140 grains per hour.

This standard appears to have been recommended as the mean result deduced from experiments made upon spermaceti candles (short sixes), purchased indiscriminately from the following parties, viz., Messrs. Barton, Messrs. Battye, Messrs. Cowan, Messrs. Hale, Messrs. Wickenden, and Messrs. Wilmot.

The following are the mean results referred to, according to experiments made by Professor Graham and Dr. Leeson :—

Messrs.	Barton's	candles	consumed	on an average	146·1 grains per hour.
,,	Battye's	,,	,,	,,	133·1 ,,
,,	Cowan's	,,	,,	,,	142·9 ,,
,,	Hale's	,,	,,	,,	133·4 ,,
,,	Wickenden's	,,	,,	,,	141·1 ,,
,,	Wilmot's	,,	,,	,,	141·6 ,,
	Mean.				139·7

Notwithstanding these experiments, our previous experiments would induce us to believe that a consumption of 140 grains per hour by an ordinary spermaceti candle (short sixes) is beyond the average of the greater number manufactured in this metropolis; and, although we are all agreed in the propriety of adopting spermaceti in preference to wax, and see no reason to object to the liberal adoption by Mr. Croll and the company of a standard calculated to assure to the public a large amount of illuminating power, we have experienced some difficulty in obtaining spermaceti candles from a well-known manufacturer thereof approaching the standard in question, and we have reason to believe that very few, if any, candles are manufactured of pure spermaceti.

These considerations induced us to experiment on spermaceti candles (short sixes) obtained from the following well-known and established manufacturers, viz., Messrs. Barclay, Field, Miller, Ogleby, and Toussaint.

The candles so obtained were separately and independently experimented on, as follows :—

By Professor Brande, May 13, 1852, Temp. 63°.—Spermaceti candles (short sixes) consumed :—

		Grains per Hour.	
Barclay . .	No. 1	138	
	2	138	
	3	137	
	4	139	
	Mean . . .	138	Greatest variation, 2 grains.
Field . . .	No. 1	134	
	2	131	
	3	139	
	4	134	
	Mean . . .	135	Greatest variation, 8 grains.
Miller . .	No. 1	129	
	2	133	
	3	138	
	4	127	
	Mean . . .	132	Greatest variation, 11 grains.
Ogleby . .	No. 1	124	
	2	127	
	3	129	
	4	129	
	Mean . . .	127	Greatest variation, 5 grains.
Toussaint .	No. 1	133	
	2	136	
	3	137	
	4	144	
	Mean . . .	138	Greatest variation, 11 grains.

Average consumption of a spermaceti candle (short sixes), deduced from four experiments upon 15 candles, is 134 grains.

Average weight of candles :—

Barclay	1151 grains.
Field	1160
Miller	1151
Ogleby	1138
Toussaint . . .	1150
	5750
Mean	1150

By Mr. J. T. Cooper, May 10, Temp. 60° :—

Barclay . .	No. 1	131		
	2	131·75		
	3	128·25	Minimum	
	4	143·25	Maximum	
	5	130·25		
	6	134·75		
	Mean . . .	133·21	Temp. 60°	Greatest var. 5 grs.
Field . . .	No. 1	134·25		
	2	131·75		
	3	136·50	Maximum	
	4	131· 0	Minimum	
	5	171·75		
	6	131·50		
	Mean . . .	132·79	Temp. 55°	Greatest var. 5·50 grs.
Miller . .	No. 1	134·25	Maximum	
	2	123· 0		
	3	129· 0		
	4	131·75		
	5	122·75	Minimum	
	6	124·25		
	Mean . . .	127·50	Temp. 60°	Greatest var. 11·50 grs.
Ogleby . .	No. 1	125·25		
	2	124·50		
	3	124·50		
	4	128·75	Maximum	
	5	126·00		
	6	119·75	Min.	
	Mean . . .	124·92	Temp. 56°	Greatest var. 9 grs.
Toussaint .	No. 1	145· 0		
	2	149·25	Maximum	
	3	139·25	Minimum	
	4	146·50		
	5	145· 0		
	6	141· 0		
	Mean . . .	144·17	Temp. 60°	Greatest var. 10 grs.

By Professor Graham, May 11, 1852, Temp. 66°. Mean of three candles, each burned two hours :—

Barclay	152·4
Field and Co. . .	138·8
Miller.	133·03
Ogleby and Co. .	138·7
Toussaint . . .	145·4

By Dr. H. B. Leeson, May 12, 1852, Temp. 60° :—

Barclay. .	No. 1—1st hour. .	139·5	
	2nd ,, . .	138·5	
	3rd ,, . .	140·7	Variation 2·2
	2—1st ,, . .	134·9	
	2nd ,, . .	134·0	
	3rd ,, . .	135·0	Variation, 1·0
	3—1st ,, . .	135·0	
	2nd ,, . .	136·6	
	3rd ,, . .	140·4	Variation, 5·4
	Mean . . .	137·1	Greatest variation, 5·4
Field . .	No. 1—1st hour. .	129·9	
	2nd ,, . .	129·9	
	3rd ,, . .	129·0	Variation, 0·9
	2—1st ,, . .	136·9	
	2nd ,, . .	136·4	
	3rd ,, . .	136·0	Variation, 0·9
	3—1st ,, . .	130·0	
	2nd ,, . .	128·5	
	3rd ,, . .	130·4	Variation, 1·9
	Mean . . .	131·8	Greatest variation, 1·9
Miller . .	No. 1—1st hour. .	132·0	
	2nd ,, . .	129·4	
	3rd ,, . .	130·7	Variation, 2·6
	2—1st ,, . .	133·0	
	2nd ,, . .	133·5	
	3rd ,, . .	134·5	Variation, 1·5
	3—1st ,, . .	120·0	
	2nd ,, . .	123·5	
	3rd ,, . .	130·4	Variation, 10·4
	Mean . . .	129·6	Greatest variation, 10·4
Ogleby . .	No. 1—1st hour. .	125·8	
	2nd ,, . .	124·9	
	3rd ,, . .	123·4	Variation, 2·4
	2—1st ,, . .	125·4	
	2nd ,, . .	125·4	
	3rd ,, . .	125·5	Variation, 0·1
	3—1st ,, . .	121·0	
	2nd ,, . .	121·6	
	3rd ,, . .	125·0	Variation, 4
	Mean . . .	124·2	Greatest variation, 4
Toussaint .	No. 1—1st hour. .	138·4	
	2nd ,, . .	139·3	
	3rd ,, . .	137·6	Variation, 1·7
	2—1st ,, . .	135·2	
	2nd ,, . .	136·0	
	3rd ,, . .	135·0	Variation, 1·0
	3—1st ,, . .	134·8	
	2nd ,, . .	141·2	
	3rd ,, . .	142·9	Variation, 8·1
	Mean . . .	137·8	Greatest variation, 8·1

Comparing the above results :—

	Brande.	Cooper.	Graham.	Leeson.	Means.
Barclay . .	138 . .	133·21 . .	152·4 . .	137·1 . .	140·1 grains.
Field . . .	135 . .	132·79 . .	138·8 . .	131·8 . .	134·5
Miller . . .	132 . .	127·50 . .	133·3 . .	129·6 . .	133·1
Ogleby. . .	127 . .	124·92 . .	138·7 . .	124·2 . .	128·7
Toussaint . .	138 . .	144·17 . .	145·4 . .	137·8 . .	141·3
					677·7
Mean					135·5

Greatest variation :—

	Barclay.	Field.	Miller.	Ogleby.	Toussaint.	
Brande .	2 . . .	8 . . .	11·0 . . .	5 . . .	11	grains.
Cooper .	5 . . .	5·50 . . .	11·50 . . .	9 . . .	10	
Leeson .	5·4 . . .	1·9 . . .	10·4 . . .	4 . . .	8·1	
	12·4	15·4	32·9	18	29·1	
Means .	4·1	5·1	10·9	6	9·3	

Greatest variation in conjoined results :—

Barclay.	Field.	Miller.	Ogleby.	Toussaint.
19·2 . . .	7 . . .	5·8 . . .	14·5 . . .	7·6

From these results it is apparent that the candles made by Messrs. Barclay and Toussaint most closely approximate to the proposed standard; and it was therefore determined to make a fresh set of experiments on the candles of these two makers conjointly, and with the scales constructed for the purpose, under the direction of Dr. Leeson, at the company's offices, Coleman Street. Finding, also, that the candles procured from Messrs. Miller had a glass ring surrounding the wick, which was evidently objectionable in comparative experiments—and which, in fact, not having been found to answer, has been discontinued by those manufacturers—it was also thought advisable to include Miller's candles in the proposed new set of experiments.

After burning the candles at the upper end, they were then cut in two, and, commencing at the centre, burnt towards the lower end. One set of Miller's candles, however, were burnt first from the top and then from the lower end. It is scarcely necessary to observe that the candles in every instance had their conical ends burnt off, and in fact were allowed to burn a sufficient length of time to allow the wicks just to curl themselves into the self-consuming position (that is, the tip of the wick just protruding from the flame), and that great care was taken that no currents of air should disturb the quiet and steady consumption of the candles, and that any candle guttering was rejected. This, in fact, only occurred in one instance.

In making further experiments, we also thought it desirable to try the difference between candles recently manfactured, and those which had been made for some time.

The result of these further experiments is now subjoined. They were principally conducted by Messrs. Brande, Cooper, and Leeson, Professor Graham having been absent on the continent the greater portion of the time.

Barclay's Spermaceti Candles, 15 days old when burnt June 22. Temp. 72°.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Hour.	Variation.
BA. . . .	3 26 0	consumed	50	in 22 10 =	44 20 . .	135 max.	
	3 48 35	,,	100		44 45 . .	134	
Commenced .	3 5 50	,,	100–50	22 35	45 30 . .	132	6
Cut . . .	4 56 20	,,	50	22 30	45 0 . .	133	
	5 19 45	,,	100		46 35 . .	129 min.	
Commenced .	4 33 50	,,	100–50	23 25	45 50 . .	131	

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Honr.	Variation.
BB. . . .	3 27 31	,,	50	22 26	44 52 . .	134 max.	
	3 50 42	,,	100		44 37 . .	134	
Commenced .	3 5 5	,,	100–50	23 11	46 22 . .	129·5	6
Cut . . .	4 59 54	,,	50	23 14	46 28 . .	129	
	5 23 26	,,	100		46 46 . .	128	
Commenced .	4 36 40	,,	100–50		46 44 . .	128 min.	
BC. . . .	3 38 55	,,	50	22 10	44 20 . .	135 max.	
	3 51 55	,,	100		45 10 . .	133	
Commenced .	3 6 45	,,	100–50	23 0	46 0 . .	130	7
Cut . . .	5 2 10	,,	50	23 20	46 40 . .	128 min.	
	5 24 50	,,	100		46 0 . .	130	
Commenced .	4 38 50	,,	100–50	22 40	45 20 . .	132	
BD. . . .	3 32 52	,,	50	22 47	45 34 . .	132	
	3 55 8	,,	100		45 3 . .	133	
Commenced .	3 10 5	,,	100–50	22 16	44 32 . .	134 max.	6
Cut . . .	5 3 25	,,	50	22 50	45 40 . .	131	
	5 26 50	,,	100		46 15 . .	130	
Commenced .	4 40 35	,,	100–50	23 25	46 50 . .	128 min.	
BE. . . .	3 34 38	,,	50	22 15	44 30 . .	135 max.	
	3 57 55	,,	100		45 32 . .	132	
Commenced .	3 12 23	,,	100–50	23 17	46 34 . .	129 min.	6
Cut . . .	5 4 20	,,	50	22 55	45 50 . .	132	
	5 26 56	,,	100		45 31 . .	132	
Commenced .	4 41 25	,,	100–50	22 36	45 12 . .	133	
BF. . . .	3 38 10	,,	50	22 22	44 44 . .	134	
	4 1 27	,,	100		45 29 . .	132 min.	
Commenced .	3 15 48	,,	100–50	22 17	44 34 . .	135	
Cut . . .	5 16 0	,,	70		44 32 . .	135	6
	5 29 17	,,	100		44 32 . .	135	
Commenced .	4 44 45	,,	100–70	13 17	44 18 . .	135 max.	
						4751·5	

Greatest difference, 7.
Mean variation of single candle, 5·8

131·99

Barclay's Spermaceti Candles, two months old. Burnt June 15, 1852. Temp. 66° at 3 p.m., 68° at 6 p.m.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Hour.	Variation.
No. 1 . . .	4 18 10	consumed	50	in 23 0 =	46 0 . .	130	
	4 10 15	,,	100		45 5 . .	133	
Commenced .	3 55 10	,,	100–50	22 5	44 10 . .	136 max.	9
Cut. . . .	5 22 10	,,	50	22 45	45 30 . .	132	
	5 45 45	,,	100		46 20 . .	129·5	
Commenced .	4 59 25	,,	100–50	23 35	47 10 . .	127 min.	
No. 2 . . .	4 18 15	,,	50	21 15	42 30 . .	141	
	4 39 30	,,	100		42 30 . .	141	
Commenced .	3 57 0	,,	100–50	21 15	42 30 . .	141	
Cut. . . .	5 21 0	,,	50	20 35	41 40 . .	144 max.	6
	5 42 45	,,	100		42 20 . .	141	
Commenced .	5 0 25	,,	100–50	21 45	43 30 . .	138 min.	
No. 3 . . .	4 21 20	,,	50	21 50	43 0 . .	139 min.	
	4 43 0	,,	100		43 10 . .	139	
Commenced .	3 59 50	,,	100–50	22 40	44 20 . .	135	
Cut. . . .	5 30 25	,,	50	23 10	46 20 . .	129 max.	10
	5 53 0	,,	100		45 35 . .	132	
Commenced .	5 7 15	,,	100–50	23 25	46 50 . .	129	
No. 4 . . .	4 22 30	,,	50	22 20	44 40 . .	134	
	4 44 30	,,	100		44 20 . .	135	
Commenced .	4 0 10	,,	100–50	22 0	44 0 . .	136 max.	
Cut. . . .	5 28 55	,,	50	22 55	45 50 . .	131	5
	5 51 50	,,	100		45 50 . .	131	
Commenced .	5 6 0	,,	100–50	22 55	45 50 . .	131 min.	
No. 5 . . .	4 25 10	,,	50	23 0	46 0 . .	130	
	4 48 20	,,	100		46 10 . .	130	
Commenced .	4 2 10	,,	100–50	23 10	46 20 . .	129	
Cut. . . .	5 35 5	,,	70	32 35	45 33 . .	132 max.	3
	5 49 0	,,	100		46 30 . .	129 min.	
Commenced .	5 2 30	,,	100–70	13 55	45 56 . .	131	
No. 6 . . .	4 27 35	,,	50	22 45	45 30 . .	132	
	4 50 10	,,	100		45 20 . .	132	
Commenced .	4 4 50	,,	100–50	22 35	45 10 . .	133 max.	4
	5 32 30	,,	60	27 50	46 24 . .	129	
	5 51 10	,,	100		46 30 . .	129	
Commenced .	5 4 40	,,	100–60	18 40	46 40 . .	129 min.	
						4659·5	

Greatest difference, 144 — 127 = 17.
Next ,, 141 — 129 = 12.
Mean variation of candle, 6.

Mean 130·53

Miller's Spermaceti Candles (short sixes), about three months old. Burnt Tuesday, June 8, 1852, Temp. 70°; and Friday, June 11, 1852, Temp. 61°.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains. per Hour.	Variation.
M × 1 . .	4 18 50	consumed	50	in 23 50 =	47·40 . .	126 min.	
	4 23 30	,,	60	28 30	47·30 . .	126	
	4 42 20	,,	100		47·20 . .	127	
Commenced.	3 55 0						
Inverted . .	2 52 20	,,	50	23 11	46 22 . .	129	8
	3 5 54	,,	80	35 45	44 40 . .	134 max.	
	3 15 0	,,	100		45 51 . .	131	
Commenced .	2 29 9						
M × 2 . .	4 9 40	,,	50	23 40	47 20 . .	127	
	4 19 35	,,	70	33 35	48 0 . .	125 min.	
	4 33 35	,,	100		47 35 . .	126	
Commenced .	3 46 0						
Inverted . .	2 45 11	,,	30	13 6	43 40 . .	137	12
	2 54 19	,,	50	21 14	44 28 . .	135	
	3 7 22	,,	80	35 17	44 6 . .	136	
	3 15 46	,,	100		43 41 . .	137 max.	
Commenced .	2 32 5						
M × 3 . .	4 6 0	,,	30	13 40	45 35 . .	132	
	4 15 20	,,	50	23 0	46 0 . .	130	
	4 38 30	,,	100		46 10 . .	130	
Commenced .	3 52 20						
Inverted . .	2 46 13	,,	30	13 58	46 35 . .	129	9
	2 55 5	,,	50	23 50	47 40 . .	126 min.	
	3 8 10	,,	80	35 55	44 39 . .	134	
	3 16 50	,,	100		44 35 . .	135 max.	
Commenced .	2 32 15						
M × 4 . .	4 15 20	,,	40	18 40	46 40 . .	128	
	4 29 50	,,	60	33 10	55 18 . .	–	
	4 33 50	,,	100		47 10 . .	127 min.	
Commenced .	3 56 40						
Inverted . .	2 53 15	,,	40	18 14	45 38 . .	131·5	7
	2 57 36	,,	50	22 36	45 12 . .	132·5	
	3 11 0	,,	80	36 0	45 0 . .	133	
	3 19 42	,,	100		44 42 . .	134 max.	
Commenced .	2 35 0						
						3398	

Mean 130·69

Miller's Spermaceti Candles (short sixes), about four years old, with glass rings removed. Burnt Tuesday, June 8, 1852. Temp. °.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Hour.	Variation.
M 1 . . .	3 49 20	consumed	50	in 13 50 =	46 7 . .	130	
	3 59 0	,,	50	23 30	47 0 . .	127	
	4 13 10	,,	80	37 40	47 5 . .	127 min.	
	4 22 50	,,	100		47 0 . .	128	
Inverted . .	2 41 42	,,	30	13 32	45 45 . .	131	5
	2 51 2	,,	50	22 52	45 35 . .	132 max.	
	3 4 57	,,	80	36 47	45 58 . .	131	
	3 14 2	,,	100		45 52 . .	131	
Commenced .	2 28 10						

Thursday, June 26. Temp. 70°.

MOA . . .	3 32 0	consumed	50	in 23 30 =	47 0 . .	128 min.	
	3 54 30	,,	100		46 0 . .	130·5	
Commenced .	3 8 30						
Cut down. .	4 52 11	,,	50	22 45	45 30 . .	132	5
	5 14 35	,,	100		45 9 . .	133 max.	
Commenced .	4 29 26						
MOB . . .	3 34 56	,,	50	24 1	48 2 . .	125 min.	
	3 56 36	,,	100		45 41 . .	131	
Commenced .	3 10 55						
Cut down. .	4 53 20	,,	50	22 45	45 30 . .	132 max.	7
	5 16 31	,,	100		45 56 . .	131	
Commenced .	4 30 35						
MOC . . .	3 35 26	,,	50	22 49	45 38 . .	131·5 min.	
	3 57 51	,,	100		45 14 . .	133	
Commenced .	3 12 37						3·5
Cut down. .	4 54 50	,,	50	22 16	44 32 . .	135 max.	
Commenced .	4 32 34						
MOD . . .	3 36 42	,,	50	22 47	45 34 . .	132 max.	
	3 59 37	,,	100		45 42 . .	131	
Commenced .	3 13 55						2
Cut down. .	4 58 3	,,	50	23 6	46 12 . .	130	
	5 21 10	,,	100		46 13 . .	130 min.	
Commenced .	4 34 57						
MOE . . .	3 38 44	,,	50	22 48	45 36 . .	131·5	
	4 1 19	,,	100		45 23 . .	132 max.	
Commenced .	3 15 56						5
Cut down. .	5 1 11	,,	50	23 36	47 12 . .	127 min.	
	5 24 19	,,	100		46 44 . .	129	
Commenced .	4 37 35						
MOF . . .	3 41 48	,,	50	22 28	44 56 . .	134 max.	
	4 4 11	,,	100		44 51 . .	134	
Commenced .	3 19 20						6
Cut down. .	5 3 24	,,	50	23 12	46 24 . .	129	
	5 27 9	,,	100		46 57 . .	128 min.	
Commenced .	4 40 12						
						4046	

Mean 130·53

Toussaint's Spermaceti, 16 candles, days old. Burnt Wednesday, June 23, 1852. Temp. 71°.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Hour.	Variation.
Ta	3 27 57	consumed	50	in 21 30 =	43 0 . .	139	
	3 49 15	,,	100		42 58 . .	140 max.	
Commenced .	3 6 27	,,	100–50	21 38	42 56 . .	140	3
Cut. . . .	4 55 45	,,	50	21 47	43 34 . .	138	
	5 17 25	,,	100		43 37 . .	138	
Commenced .	4 33 58	,,	100–50	21 50	43 40 . .	137 min.	
Tb	3 30 30	,,	50	22 5	44 10 . .	136	
	3 52 36	,,	100		44 11 . .	136	
Commenced .	3 8 25	,,	100–50	22 6	44 12 . .	136	
Cut. . . .	4 57 48	,,	50	21 58	43 56 . .	137 max.	5
	5 20 35	,,	100		44 45 . .	134	
Commenced .	4 35 50	,,	100–50	22 47	45 34 . .	132 min.	
Tc	3 32 17	,,	50	21 37	43 14 . .	139 max.	
	3 54 10	,,	100		43 10 . .	139	
Commenced .	3 10 40	,,	100–50	21 53	43 46 . .	139	
Cut. . . .	5 1 45	,,	50	22 30	45 0 . .	139	3
	5 23 30	,,	100		44 15 . .	136 min.	
Commenced .	4 30 15	,,	100–50	21 35	43 10 . .	139	
Td	3 34 12	,,	50	21 30	43 0 . .	139 max.	
	3 56 51	,,	100		43 9 . .	139	
Commenced .	3 12 42	,,	100–50	22 9	44 18 . .	136	
Cut. . . .	5 2 58	,,	50	22 10	44 20 . .	135	5
	5 25 17	,,	100		44 29 . .	135	
Commenced .	4 40 48	,,	100–50	22 19	44 38 . .	134 min.	
Te	3 20 41						
	3 57 22	,,	100		43 22 . .	138 max.	
Commenced .	3 14 0						6
Cut. . . .	5 6 55	,,	50	22 45	45 30 . .	132 min.	
	5 29 15	,,	100		45 5 . .	133	
Commenced .	4 44 10	,,	100–50	22 20	44 40 . .	134	
Tf	3 36 52	,,	50	21 42	43 24 . .	138 max.	
	3 58 35	,,	100		43 25 . .	138	
Commenced .	3 15 10	,,	100–50	21 43	43 26 . .	138	
Cut. . . .	5 9 20	,,	50	22 10	44 20 . .	135	4
	5 31 40	,,	100		44 29 . .	135	
Commenced .	4 47 10	,,	100–50		44 29 . .	134 min.	
						4647	

Mean 136·67

Toussaint's Spermaceti Candles. Burnt Friday, June 11. Temp. 61°.

	h. m. s.		Grains.	m. s.	Per 100. m. s.	Grains per Hour.	Variation.
T 1	4 17 35	consumed	20	in 8 42 =	43 30 . .	138 max.	
	4 30 35	,,	50	21 42	43 24 . .	138	
	4 52 22	,,	100		43 29 . .	138	1
Commenced .	4 8 53	,,	100–50	21 58	43 42 . .	137 min.	
T 3	4 15 35	,,	20	8 23	41 56 . .	143	
	4 28 0	,,	50	20 47	41 34 . .	144 max.	
	4 49 30	,,	100		42 17 . .	142	5
Commenced .	4 7 13	,,	100–50	21 30	43 0 . .	139 min.	
T 4	4 21 57	,,	20	8 22	41 50 . .	144 max.	
	4 34 55	,,	50	21 20	41 40 . .	144	
	4 55 55	,,	100		42 40 . .	141 min.	3
Commenced .	4 13 35	,,	100–50	21 0	42 0 . .	143	
T 5	4 21 10	,,	20	8 40	43 20 . .	139 max.	
	4 34 22	,,	50	21 52	43 42 . .	137 min.	
	4 56 0	,,	100		43 30 . .	138	2
Commenced .	4 12 30	,,	100–50	21 38	43 16 . .	139	
						2244	

T 2 was rejected, having guttered.

Mean 140·25

Mean General Results collected:—

Maker.	Age.	Grains consumed per Hour. Max.	Min.	Mean.	Variation. Total Greatst.	Single Greatst.	Candle Mean.
Barclay ..	15 days ..	135 ..	128 ..	132 ..	7 ..	7 ..	5·8
	2 months ..	144 ..	127 ..	130·53 ..	17 ..	10 ..	6
Miller ..	3 months ..	137 ..	125 ..	130·69 ..	12 ..	12 ..	9
	4 years ..	135 ..	125 ..	130·53 ..	8 ..	7 ..	4·8
Toussaint .	16 days ..	140 ..	132 ..	136·65 ..	8 ..	6 ..	4·3
	6 weeks ..	144 ..	137 ..	140·33 ..	7 ..	5 ..	2·75

Or, combining the results of Old and New Candles:—

Barclay	144 ..	127 ..	131·20 ..	17 ..	10 ..	5·9
Miller.	137 ..	125 ..	130·6 ..	12 ..	12 ..	6·9
Toussaint	144 ..	132 ..	138·49 ..	12 ..	6 ..	3·52

It is evident from the foregoing experiments that Toussaint's candles are to be preferred, as approximating most closely to the given standard of 140 grains per hour, and as being most uniform in their rate of consumption.

These experiments also show that age is of little importance in the selection of the candles.

The candles are all, unfortunately, made conical, being largest by about 1-16th of an inch at their lowest extremity, the consequence of which is that, with many exceptions depending on accidental irregularities of wick, they burn more slowly towards the lowest and thickest end. If candles were manufactured expressly for the purpose, we should prefer them of uniform thickness, and they might then be made of pure spermaceti. By uniform thickness we should avoid a variation amounting to about six grains per candle, or to about 4¼ per cent.

In the absence, however, of candles manufactured expressly for this purpose, and in reply to your first question, we recommend that Messrs. Toussaint's spermaceti candles (short sixes) be used for the purpose of testing daily the quality of the gas.

That a quantity, say six dozen pounds, be ordered, all made at one time, and be submitted to ourselves for examination.

We then propose to take one sample-candle of each parcel of twelve, to cut such candle in half, and try its rate of burning from the centre, thus taking a mean thickness.

That an average of all the samples thus examined be taken and made the basis of calculation with reference to the adopted standard of 140 grains.

That any parcel, the sample of which varies more than two grains from the average result, be rejected, and that the others be reserved for use, and marked with a stamp of approval and a number.

That when such candles are used, two inches be burnt off the upper end before comparing the gas, and that no candle be burnt within less than two inches of its lower extremity.

In reply to your next inquiry, as to what instruments are to be employed, we recommend for weighing the candles the balances contrived by Dr. Leeson, and constructed by Messrs. De Grave for the company.

This balance has a beam 10 inches long, and turns with 1-10th of a grain. It is constructed with a scale carrying a socket above the beam to hold the candle, thus preventing any effect of temperature upon the beam, and the necessity of blowing out the candle while weighed, by which we also avoid the inaccuracy resulting from inequality of consumption at first lighting.

To use these balances, place the candle in the socket, and allow it to burn at least 15 minutes, until the wick just protrudes from the side of the flame, and consumes itself away, all currents of air being of course avoided, and no guttering allowed. Then counterbalance the candle with shot placed in the opposite scale, leaving the candle slightly the heaviest. Then take a watch with a seconds' hand, and observe the second when the beam rises to the exact level. Then place 50 or any other number of grains in the scale-pan beneath the candle, and also a 2-grain weight in the opposite pan containing the shot as a warning—the better to direct the observer's attention to the precise moment when, 50 grains weight having been consumed, the beam regains the level position. When the candle end of the beam rises, remove the warning-weight, steady the scale-pans, and again observe the second when the beam regains the level position; the difference of time indicates the period required to consume the 50 grains, and the subjoined table will give the rate of consumption per hour. It is well to repeat the experiment with another 50 grains, thus making 100 grains consumed, which we consider the least amount that ought to be burnt in order to ascertain the rate of consumption.

The temperature should at the same time be observed by an ordinary thermometer.

A Table showing, from the Time occupied in Burning 100, 50, and 25 Grains of Material, the Relative Rate of Combustion per Hour.

Consumpn. in Grains per Hour.	Difference for One Grain.	Time of Burning 100 Grains.	Time of Burning 50 Grains.	Time of Burning 25 Grains.	Time of Burning 20 Grains.	Time of Burning 5 Grains.
		m. s.	m. s.	m. s.	m. s.	m. s.
120	25	50 0	25 0	12 30	10 0	2 30
121	25	49 35	24 47	12 23	9 55	2 29
122	24	49 10	24 35	12 17	9 50	2 27·5
123	24	48 47	24 23	12 11	9 45	2 26
124	24	48 23	24 11	12 5	9 40	2 25
125	23	48 0	24 0	12 0	9 36	2 24
126	23	47 37	23 48	11 54	9 31	2 23·5
127	22	47 14	23 7	11 33	9 27	2 22
128	22	46 52	23 26	11 43	9 22	2 20·5
129	22	46 30	23 15	11 37	9 18	2 19
130	21	46 9	23 4	11 32	9 14	2 18·5
131	21	45 48	22 54	11 27	9 9·6	2 17·6
132	21	45 27	22 43	11 21	9 5	2 16
133	20	45 6	22 33	11 16	9 1	2 15
134	20	44 46	22 23	11 11	8 57	2 14
135	20	44 26	22 13	11 6	8 53	2 13
136	19	44 7	22 3	11 1	8 49	2 12
137	19	43 48	21 54	10 57	8 45	2 11
138	19	43 29	21 44	10 52	8 42	2 10
139	19	43 10	21 35	10 47	8 38	2 9
140	18	42 51	21 25	10 42	8 34	2 8·5
141	18	42 33	21 16	10 38	8 30	2 7·5
142	18	42 15	21 7	10 33	8 27	2 6·7
143	17	41 57	20 58	10 29	8 23	2 6
144	17	41 40	20 50	10 25	8 20	2 5
145	17	41 23	20 41	10 20	8 16·6	2 4·4
146	17	41 6	20 33	10 16	8 13	2 3
147	16	40 49	20 24	10 12	8 9·9	2 2·4
148	16	40 32	20 16	10 8	8 6·4	2 1·6
149	16	40 16	20 8	10 4	8 3	2 0·7
150	16	40 0	20 0	10 0	8 0	2 0

For testing the illuminating power of the gas, we recommend the photometer as constructed for the company under the direction of Dr. Leeson, and particularly the screen contrived by that gentleman, consisting of a piece of paper perforated with any pattern that may be preferred, and then placed between another piece of paper folded round it so as to cover it with a uniform thickness on both sides. By this plan we avoid the interference of colour in estimating the difference of illumination, which renders the greased disc commonly used objectionable.

The thickness of the paper employed may be varied to suit different observers, and it will be found generally that thicker or thinner paper is to be preferred according to the greater or less intensity of the lights which are the subject of experiment.

We recommend a dry meter, well and carefully constructed and adjusted, as preferable to the water-meter, on account of the alterations which may occur in the quality of the gas owing to matter being absorbed or given off by the water.

We recommend a governor, most carefully adjusted, to be attached to the meter, so as to ensure uniformity in the flow of gas during the experiment; and we recommend metal pipes in preference to indiarubber or gutta-percha pipes for the connexions and conveyance of the gas to the meter.

We recommend a 7-inch glass chimney, 2 inches wide inside, to be so placed with reference to the 15-hole argand burner 1 inch in diameter, as that the top of the chimney shall measure 6¼ inches from the orifice of the burner, these dimensions being those ordinarily adopted. The gallery supporting the chimney to be dark or bronzed, and to be so constructed as to interfere as little as possible with the transmission of light.

We recommend the experiments to be made in a chamber hung with black, and black curtains or shutters, to be used, so that the screen of the photometer may be observed between their opening without the eyes being exposed to the direct light of the gas or candle.

We recommend that the flames of the gas or candle be not less than 5 feet removed from the side of the darkened chamber, and that no reflecting surface be permitted to interfere with the correctness of the observation. Black serge answers the purpose for darkening the chamber, but any black unglazed material may be employed.

The use of the photometer, and the conditions to be observed in taking the observations, form the subject of your third question.

First, then, a considerable quantity of gas should be passed through the meter before making an observation, to ensure the gas from being contaminated with air or other gas remaining in the meter, and also to prevent the experiment from being made upon gas merely stagnant in the adjacent pipes, instead of that actually supplying the public at the time. For a like reason, observations during the nocturnal period of consumption are to be preferred to those made during the day.

Next, other supplying-cocks being fully opened, the adjusting-cock of the burner must be opened and regulated so that the flow of gas to the burner is exactly equal to 5 cubic feet per hour, as indicated by the meter after two, at least, complete revolutions of its index. Care must be taken that the argand burner has its holes so cleaned and opened when necessary, by a regulating broach to be used when required, that the flame may be regular and uniform. If the flame be irregular or unsteady, the observation must not be relied on.

During the time of adjusting the meter, and otherwise preparing for the experiment, the candle should be lighted and kept burning. It must be placed with the wick bending in a line parallel to the screen. The summit of the dark internal cone of the flame should be of the same height as the centre of the screen of the photometer. The wick should on no account be snuffed or otherwise interfered with, but must be left to burn as before explained, until its bent position is just protruding from the flame, and thus consuming itself. If guttering or thieving take place, a fresh candle must be made use of, and inasmuch as a candle when moved alters its rate of burning at the time, a sufficient interval—at least 15 minutes—must elapse previous to any determination of relative illuminating power. All currents of air must of course be avoided, but the chamber should, if possible, be so ventilated as to insure uniformity of temperature during the experiment.

The position of the screen with reference to the gas-burner should be so adjusted that the centre of the screen coincides with a horizontal line bisecting the flame, as measured from the orifices of the burner.

After making the observation and recording the result, the meter must again be examined and timed, so that the observer may feel satisfied that the rate of consumption of the gas has not altered from 5 cubic feet per hour during the experiment; if otherwise, the experiment must be repeated.

The observer should note the pressure of the gas before and after passing through the meter. He should record the year, day, hour, and minute when the observation is made, together with the temperature before and after his experiments are concluded. Having made an experiment, the screen should be shifted and the meter examined; then the observation should be repeated, and so on until three observations have been made, the mean of which should be taken and recorded.

We are aware that an exact determination of illuminating power could only be arrived at by corrections duly made for the variations resulting from the varying conditions of atmospheric temperature and pressure; but, inasmuch as the illuminating power of the gas is to be ascertained under the same circumstances of pressure and temperature as the gas supplied to the public, and as such changes may be supposed to average themselves throughout the year, we do not think it requisite to recommend any consideration of these circumstances as affecting your contract with Mr. Croll.

We should have been glad, had time permitted, to have made some further experiments to determine how far temperature affects the rate of consumption of the spermaceti candle, as also in reference to the manufacture of a spermaceti candle, as before suggested; but we trust we have sufficiently answered the questions proposed to us to enable you to complete your arrangements with Mr. Croll.

WM. THOS. BRANDE,
JOHN THOMAS COOPER,
H. B. LEESON,
THOS. GRAHAM.

London, July 1, 1852.

Examination resumed: The board never required Mr. Croll to increase the standard of illuminating power. Mr. Clift's tender was for twelve candles of 140 grains sperm, and Mr. Croll's performances have been certainly not over that.

Cross-examined by Mr. ARCHIBALD: I know that the arrangement under the letter of the 29th of April was that both parties should have a report from the referee. Mr. Croll has seen Dr. Leeson's reports, and knows the relative value of his and Dr. Letheby's, because that has been the subject of conversation; and I likewise state that Mr. Croll at one time agreed verbally to take Dr. Letheby's report, and the secretary tried to get Mr. Croll to sign a note to that effect, in order to save a little expense to us, and although he agreed verbally, Mr. Croll declined to sign it, but I can swear that Mr. Croll had cognizance of Dr. Leeson's report as well as Dr. Letheby's. He did not require that allowance should be made for the difference between Dr. Leeson's and Dr. Letheby's reports. We take it that both give the absolute value of the illuminating power.

Mr. LLOYD: He was the referee.

Witness: But it was at an expense to the company of 100 guineas a year.

Mr. ARCHIBALD: Here is a calculation to be made under the fourth section of the letter, that, after bringing the whole into calculation of 140 grains per candle, he shall deliver to each party, on the last day of each month, a statement of the average amount of candles that each represents. Do you mean to say that those have been furnished to Mr. Croll?

Witness: I do not know whether a report has been sent to Mr. Croll every month by the referee, but he has had access to the reports, and knows them as well as the board and the public. He has had constant access to all the books of the company, and I know that he has seen the reports of Dr. Leeson, because it has been a subject of conversation at the board that he should take Dr. Letheby's instead of Dr. Leeson's, and his remark was that Dr. Letheby's was more favourable than Dr. Leeson's. I recollect Mr. Croll asked Dr. Letheby (at least so he stated to me) to give him the difference between taking the gas in an open room, with uncovered wails, and the difference of taking it in the mode he took it under the contract. I knew there was a difference. We presented a memorial to the Commissioners of Sewers referring to the difference between the new mode and the old mode. I know the mode of testing the illuminating power in use at the time of Mr. Croll's first contract, and I recollect that it was very much commented upon in evidence before Parliament as being very incorrect; and I know if we enter into a contract with gentlemen, as men of business, we should take care that the mode of determining the value of the article to be sold to us should be a correct and proper mode of doing it, and it was on that principle that I have always considered Mr. Croll's contract. I have not sufficient experience in the mode of taking illuminating power in other companies to know whether the method introduced by Dr. Letheby differs from that in general use, but I presume that a man like Dr. Letheby would take it in a proper manner.

Mr. ARCHIBALD: It is not worth my while to ask you that, because you

are not a scientific man; but you knew well in your mind, at the time you made your report to the Commissioners of Sewers, the unfavourable effect which the report of Dr. Letheby might have on the gas supplied by you. That is commented on in your report.

Witness: I do not see how that affects the contract; if others made a mistake, I do not see why we should.

Mr. ARCHIBALD: That is to say, if Mr. Croll's contract was for 9½, according to the mode he had in use at the time of his contract, you feel at liberty to alter that, and raise it to 12.

Witness: Not at all. Mr. Croll voluntarily made the offer to increase the standard, because of the competition of the gentleman from Birmingham.

Mr. LLOYD: And then an apparatus is provided by which the standard is to be determined.

Witness: I think it is very important that that should be understood, because we have had experience of differing with Mr. Croll in reference to the contract, and we went to an expense of something like £400 with these professors, in order to settle the price and the accurate mode of taking the illuminating power. Mr. Croll was a party to that, and met the professors, who were the most eminent chemists we could find in the metropolis to take it. Mr. Croll never objected to the mode which the professors adopted; I will swear most distinctly he never did.

Mr. BARLOW: Mr. Croll's contract is based on the report of Professor Graham and Dr. Leeson.

Mr. LLOYD: We are speaking of 1852.

Mr. ARCHIBALD: I find this in your minutes of the 9th of September, 1853:—

A letter was read from Dr. Leeson, dated the 8th of September, 1853:—

Bonchurch, Sept. 8, 1853.

Dear Sir,—In reply to your note, I can only beg you to assure the directors of the Great Central Gas Company that I believe the returns of the illuminating power of their gas, as taken by Mr. Tesky and myself, are as accurate and faithful as it is possible for observations to be taken. The method adopted is rigorously that laid down in the report signed by Professors Brande, Cooper, Graham, and myself, to which I do not believe any valid objection can be urged.

Your contractor has since intimated to me that he objects to a blackened chamber and other means calculated to avoid reflected light; but, as it is a simple comparative trial between a candle and the gas, both subjected to precisely the same circumstances, I cannot see how the objection applied. If the light of the gas be diminished, so is also that of the candle. Supposing the gas to be equal to 10 candles when in an ordinary room, but only equal to 9 such candles in a darkened chamber, or, in other words, one-tenth less, it is to be remembered that, since each candle in the darkened chamber would also lose one-tenth of its power, the proportion of the gas to the candle, when both taken under the same circumstances, would remain the same. It is quite evident that the illuminating power of the gas, as specified in the journal sent, must have been taken at the works, before it had lost any of its illuminating power from deposition of naphtha, &c.

As soon as the newspaper containing Thompson's experiments is published for September, I will send you the quarterly statement. The 10th being so close at hand, I think it will be well to send them all together.—I am, dear Sir, yours truly,

R. M. Massey, Esq. H. B. LEESON.

This gives you notice of Mr. Croll's objection. Were you not aware at this time that Mr. Croll objected?

Witness: I was not aware.

Mr. LLOYD: The minute shows that he objected to Dr. Leeson.

Mr. ARCHIBALD: This appears on your own minutes. You must have been aware of the objection.

Witness: Your question was, whether Mr. Croll had objected to me as to the mode of taking the illuminating power of the gas, and I said he did not object to me, and he could not according to his own contract Until you read that minute, I was not aware that he objected to any one. The objection of Dr. Leeson would not weigh with me one moment. Mr. Rait was not consulted on the subject of the contract for the public lights in 1856. It was so obviously to the interest of Mr. Croll; I knew it had been so on previous occasions, that I took it for granted it was a matter very much to be desired for him. At the meeting of 1851, when the vote of thanks was proposed to Mr. Croll, I will undertake to swear that I said nothing to the effect that Mr. Croll would expect something more substantial than thanks. If it is intended to be inferred from that that Mr. Croll had entitled himself to any payment from the company, I expressly swear that I made no such statement.

Mr. ARCHIBALD: Do you mean to say that your impression at that time was that all these three months' labour of Mr. Croll, and the responsibility which he incurred, were to be undertaken for nothing?

Witness: My knowledge of the fact was, that Mr. Croll was mainly interested; he was a large shareholder, and interested to get his 10 per cent., and in every way interested in the success of the company. And as to the three months' labour, what he did was this: the office being in the house, it was a matter of ordinary concern; it would not take up his time; it would be a simple direction to the inspectors, subject to his experience in the Chartered. I knew he had a large experience in a gas company, and as promoter of our company, I expected the support of Mr. Croll, and all the information he could give in carrying out this company.

Mr. ARCHIBALD: Do you mean to say that in addition to his being the contractor and supplying the gas, and being at the expense of furnishing you with it, that he was to undertake gratuitously the whole of the labour for three months? Was that your impression?

Witness: In the first place, I believe it is very much exaggerated as to the labour and responsibility. I do not think it occupied him half an hour per day, and if it did, I think he was bound to give his time gratuitously as the promoter of a company that was mainly founded for his reputation and profit. I think he was bound to give his services gratuitously to the extent to which he did give them. I certainly never used words to the effect suggested to me. If we had been conscious that Mr. Croll had such claims, I should have been guilty, and the board would have been guilty with me, of the most reprehensible conduct in keeping them back and dealing with the affairs of a large body of shareholders and large accounts in such a way.

The company's minute-book having been referred to, it was found that the witness was present at the meeting of the board on the 9th of September, 1853, when Dr. Leeson's letter was read.

Cross-examination resumed: In respect to the pressures named in Mr. Pontifex's report, I think the meeting at which that report was handed to Mr. Croll was at the works. I will undertake to say that Mr. Croll made no objection whatever to those pressures. We had been suffering seriously from the defect of pressure, and it was when the complaints had been discussed that this report of Mr. Pontifex was handed in as to the pressure necessary to carry on the business, and Mr. Croll undertook to give it. We had had a previous discussion at the works on other matters, and when we spoke of the absolute necessity of the company being supplied with such pressure as would enable us to carry on the public service, Mr. Croll did not intimate in any way that he considered the pressure was excessive. I may say that those pressures were so necessary that we imported them into our new contract, and there they are actually stereotyped. Mr. Clift's tender was not adopted because Mr. Croll sent in a report modifying his contract, and we were all of us unwilling that Mr. Croll should part from the company that he had with so much labour and credit to himself, I may say, established originally; and that was the only reason. There was no suggestion that Mr. Clift should see some one else with regard to the contract. He was waiting in London at that time to sign it, when the additional contract of Mr. Croll was brought in.

Mr. ARCHIBALD: You talked about the labour and responsibility of Mr. Croll during the three months not being very great. Would not the company have gone all to ruin if he had not done that?

Witness: Oh dear no! It was very desirable that some person who had a knowledge of machinery and the administration of a gas company, should settle the first onset of a company like ours; and if Mr. Croll had not done it, there were twenty people in London who would very readily have given assistance.

Mr. BOWER: For nothing?

Witness: For nothing—or a very small payment. I say that Mr. Croll had a direct interest in the company.

By Mr. ARCHIBALD: We requested Mr. Croll to do this, and I dare say there is a minute to that effect. Mr. Croll very likely before that request was made, intimated his willingness to do it, for he was first and foremost in respect to all matters connected with the company. The extra illuminating power was a matter of necessity. I do not think the company could have maintained its position without the extra illuminating power; it was necessary that the illuminating power of our gas should be as high as that of the other companies. It was a race of rivalry; whether we were the first to start the high power I do not know, but we arranged for it by the amended contract. I do not know whether with 9½ candles we could have maintained our position, but it was very desirable if the other companies ran a race of illuminating power, that we should be able to keep pace with them. I am afraid up to the period when Mr. Clift was prepared to give 12 candles of 140 sperm that the illuminating power had not been kept up, and had not flourished as it ought. At one time I am afraid the power given by Mr. Croll fell below the 9½. I have a foundation for that statement—we had a report from the City Company in which they had taken our illuminating power, which they stated they believed to be something like seven candles. They were rivals, but we were then approximating to a connexion with them, and that communication seemed to us as being not a very desirable state of things for us to be in. This was a series of observations which they had made, and which they at the time communicated to us. I do not recollect that we stated in one of our documents that Mr. Croll had, without being required, given an extra illuminating power for a long time past. I may state that when we had a common battle to fight, we put the best things on that we could. I do not mean to say that we made statements then which we would not do now. It is true, as stated in the report to the shareholders on the 30th of April, 1852—"Since January last Mr. Croll had taken upon himself, without instructions from us, to increase the illuminating power, so as to place his gas at a standard considerably above that which he was required to supply." At that time the competition had been entered into with regard to the tenders on the part of Mr. Clift. I do not remember, at the time the discussion took place with regard to the increase of price to 1s. 9d., being informed by Mr. Croll that the price of coke was only 5s. 6d. I knew the price of coke in the parliamentary estimate was 10s. I was very often surprised at the price that Mr. Croll said he got for the coke. I had no opportunity of knowing what was the price. I might have seen it written up in the office of the company. I saw Mr. Croll at that time daily, and occasionally—perhaps once a month—went to the works. It is very likely I might have made inquiry as to the price of coke. If I had heard it was at 5s. 6d., I should have thought that an extraordinary low price; but I cannot remember that I did. I know the adjoining company (the Commercial) state that their average price is 11s., and I do not know why Mr. Croll should get a smaller sum. It might be different management.

Mr. Croll's report to the board on the 11th of February, 1851, was put in:—

To the Directors of the Great Central Gas Consumers' Company.

28, *Coleman Street, Feb.* 11, 1851.

Gentlemen,—I beg respectfully to call your attention to the account tendered to the board against the company amounting to £ , with a view to its early payment.

As already stated, this claim arose from the necessity of making gas before the works were completed, and which was necessary to be done to prevent irremediable injury to the company, it being of the greatest importance that the company should be in a position to supply gas before the expiration of the 29th of September, 1850.

I should not, however, at present have pressed an early payment had I not been much disappointed in the realization of the prices of the residuary products, and upon which my calculations were based.

These estimates were made with the understanding that the works would be erected at Camden Town. In illustration of the difference of the prices obtained at the two places, I beg to submit the following example:—

PRICES AT CAMDEN TOWN—DITTO AT BOW.

8000 chaldrons coke at 11s., instead of 6s. 6d., leaving a difference of 4s. 6d. per chaldron, amounting to	£1,800	0	0
8000 chaldron breeze at 4s., instead of as now at Bow 1s., leaving a difference of	120	0	0
90,000 gallons of tar at 1d., instead of ½d., difference	182	10	0
Total	£2,102	10	0

It is because of these differences that I require all my available assets.

It must be in the recollection of many members of the board that I objected to any other situation for the erection of the works other than the vicinity of Camden Town from being aware of the comparatively higher prices received in that locality for coke and other products.

But in this, as in other cases, I submitted, regardless of my own interests, when it appeared to be for the benefit of the company. Although the consequences have been more serious to me than I had anticipated, yet I do not seek to get rid of my responsibility, and only mention such results to remove any erroneous opinions which some have formed that the contract has been very profitable to me, and also as a reason for requesting the payment of the account before referred to.

Notwithstanding these results, I have that confidence in the ultimate success of the company, that I beg to submit to the directors the following offer:—

I will accept a lease from the company of the works for a term of years, pay 10 per cent. upon the capital, and pay 6d. per 1000 feet additional upon the present registration, say 200,000,000, and 1½d. per 1000 feet when the consumption amounts to 300,000,000, and a further 1½d. per 1000 feet when the consumption amounts to 400,000,000, and so on for every additional 100,000,000 per annum.

I will also pay all expenses connected with the undertaking, with the exception of directors, surveyor, and chemical referee and secretary. I will pay all sums collected for gas rentals into the hands of the company's bankers, the company paying me at the end of each quarter the balance left by the sums which may have been paid on account. (Signed) A. A. CROLL.

(To be continued.)

Miscellaneous News.

THE LUTON LOCAL BOARD OF HEALTH AND THE GAS COMPANY.

EXTINCTION OF THE STREET LIGHTS.

So, then, it would appear that, because we are not sufficiently punished by the existence of a Board of Health—in itself no ordinary infliction—we must also be called upon to suffer all the extra pains and penalties which are likely to accrue when a body of men have, by some freak of fortune, or from the carelessness of those with whom their appointment rests, been suffered to indulge in some particular grudge, or to follow out the vagaries of their own crude judgments. But it is high time this state of things were put an end to. If the townsmen of Luton are too lazy to take proper precautions in electing, or too contemptuous to take notice of, when elected, whatever men may think fit to offer themselves candidates for positions that confer on them for a time power indeed, but to which they are neither accustomed nor in any way qualified, they can scarcely find fault when they have to bear the burden. This is true. But when a clique such as that of which, for the most part, the Board of Health consists, go to the extent, for the gratification of mere enmity or whim, of placing a whole community in a ridiculous position, and exposing them to such inconvenience as that which is now being experienced, owing to this unseemly squabble with the gas company, it is high time they should be reminded of the purposes for which they were elected, and that the community, whose servants they are, should exercise their proper power in taking measures to put an end to such absurdities. The very fact of a town like this being exposed, night after night, at the caprice of a few individuals, to all the inconveniences of darkness, is perfectly monstrous. It is, in truth, a scandal to the whole town.

Even admitting, simply for the sake of argument, that the Board of Health had cause for challenging the terms proposed by the gas company, still they would not for one moment be justified in causing this public nuisance; a nuisance, be it said, that even those inclined to judge leniently of their proceedings cannot help protesting against. But so far from their having any cause for complaint, there is no manner of doubt that the only injustice or hardship of which the company are guilty (if of any) is to private consumers, inasmuch as they offer to supply the gas to the public at a much lower rate than they do to individuals. We don't find fault with them for this; on the contrary, we think they are acting with a public spirit and good faith worthy of a better return. Still, however, it is very hard that such a state of things should for one moment be suffered to exist.

But let us, that we may not be taxed with over haste in thus censuring men, who, be they individually incompetent as they may, are at least a recognized and elected public body, pass in review the points at issue between the gas company and the Board of Health, leaving the public to judge for themselves whether or not there is in reality any cause for these proceedings.

For some years past the season for lighting here has been eight months, viz., from 1st of September to 30th of April, moonlight nights excepted; the estimated number of nights for lighting being 218. The gas company contract to light, on an average, 10 hours per night for one class of lights, and 5 hours per night for the other class; consequently, each lamp of the 10 hours class burns 2180 hours, and each lamp of the other class 1090 hours. The gas company agree to supply 5 feet of gas per hour to each burner, "and any burner not to the satisfaction of the Board of Health is to be removed, tested, and replaced to their satisfaction." The price charged for these 2180 hours' lighting, at 5 feet per hour, has been £3; but this year the board have required tenders for 4 feet per hour instead of 5 feet, and the directors took off a fifth of their price for gas, and tendered £2. 10s. per lamp. The cost for lighting and repairs is the same to the company for the 4-feet as for the 5-feet light, and is 10s. per lamp; consequently, the tenders for gas have been 50s. for 5 feet per hour, 40s. for 4 feet per hour: these prices are 4s. 6d. and a fraction per 1000 cubic feet.

The Board of Health demand a discount of 10 per cent. from this price, because the company allow 10 per cent. to their private consumers if their accounts are over £15 per quarter; the company object to this, because the discount is allowed to private consumers on a rate of 5s. 6d. per 1000 feet, and not on such a price as the Board of Health pay, viz., 4s. 6d. In order, however, to satisfy the Board of Health they offer a discount of 5 per cent., and do not stipulate for any condition as to time of payment, whereas the discount of 10 per cent. to private consumers is a conditional discount, and is forfeited if the account is not paid in three months. Now, as the Board of Health were, at the time this offer was made them, indebted to the gas company for the whole of one year and four months' gas, they cannot but be well aware that the 5 per cent., as offered to them, was more advantageous than the 10 per cent. as offered to the private consumers, unless they felt sure of being able to pay very differently in future to the way in which they have hitherto paid.

Now, the effect of the 5 per cent. is to bring down the price of gas to 4s. 3d. and a fraction per 1000 feet, *or 8d. below the price paid by the largest private consumers, even after the* 10 *per cent. discount is allowed.*

It cannot be the *amount* that the board are struggling for, as the whole sum on 92 lamps at 40s. each, 64 lamps at 20s. each, amounts to £248. Now, 5 per cent. on £248 is £12. 8s., which, divided over nearly 3000 persons, amounts to the startling sum of *one penny for each individual*, and for the sake of this one penny we are to be put to all the inconveniences of utter darkness, and to believe, moreover, that the Board of Health are fulfilling their trust when they inflict this nuisance upon us.—*Luton Times.*

THE CHARTERED GAS COMPANY.—The colleagues of Simon Adams Beck, Esq., the Deputy-Governor of the Chartered Gas Company, being desirous of expressing the high sense they entertain of the valuable services rendered by him to his company and to the public in the late arrangements for supplying the western portion of the metropolis with gas, invited him in their private capacities to a banquet at the Albion Tavern, Aldersgate Street, which was given on Friday last. The venerable Governor, Benjamin Hawes, Esq., filled the chair, with a spirit and intelligence truly remarkable in a gentleman approaching four score years and ten; and, in addition to Mr. Deffell, Mr. F. Lysons Price, Mr. Wells, Mr. Chippendale, Mr. Winsor, the Hon. Howe Browne, and Capt. J. Combes Giffard, directors of the company, Mr. Burls, the secretary, Mr. Lowe, the engineer, and Mr. Curtis, the solicitor, there were also present Mr. Martelli, director, and Mr. Andrews, secretary, of the Equitable Gas Company; Mr. Hawkins, governor, Mr. Sprague, deputy-governor, and Mr. Hinde, secretary, of the London Gas Company; Mr. F. Russell, M.P., chairman, and Mr. Barber, secretary, of the Western Gas Company; Mr. R. A. Gray, chairman of the City of London Gas Company; the Rev. J. Giffard, Mr. Chippendale, jun., Mr. J. P. Beck, and Mr. Barlow. The greatest cordiality and unanimity prevailed on the occasion, nor was the memory of the late Mr. Winsor, the originator of the company, and who practically introduced gas lighting into our streets, forgotten. The new arrangements were stated to be working very satisfactorily, and that the public already appreciated some of the advantages of the new system, which it was the intention of the companies to carry out in a liberal spirit, under the conviction that, in gaining the good will of the public, they would be best promoting their own interests.

A NOVEL REMEDY FOR HOOPING COUGH.—Great numbers of children labouring under hooping cough now visit the gas-works in Preston, for the purpose of breathing the exhalations from the gas lime. It is said that all the little sufferers feel considerably relieved, and many are absolutely cured by this simple remedy.—*Preston Guardian.*

PROPORTIONS OF MEADOW AND ARABLE LAND.—From M. Nadault de Buffon's work, the "*Cours d'Agriculture et d'Hydraulique Agricole,*" it would appear that the proportions of meadow to arable land in the principal states of Europe are as follows:—In England, Holland, Switzerland, and some parts of the north of Germany, the proportions are as 1 to 1; in the irrigated parts of Lombardy, the meadows are to the arable lands as 1 to 2; in Bavaria and Wurtemburg, as 1 to 2½; in Prussia and Austria, as 1 to 3; whilst in France they are only as 1 to 5. It also appears that in the Departments of France the most favourably circumstanced for the introduction of a system of irrigation, the average size of the holdings does not exceed 0·5 to 0·6 of an acre, and that the average frontage to the watercourses is not more than 157 feet. These facts may explain both the necessity for a systematic irrigation in France, and the difficulties attending the introduction of such a system.

NEW COAL-FIELD.—An important discovery of coal has recently been made in North Wales, by which it has been found that the Flintshire coal-bed extends into Denbighshire, as far as Denbigh, in the vale of Clwyd, if not further to the westward. The discovery of coal was made in the vale, where a seam, 1½ foot in thickness, was discovered close to the surface. The dip is not great, and it is probable that the bed could be worked to profit. An extraordinary stratum of coal has been discovered at Llwyeunion works, in Denbighshire.

Price Current.

CASTINGS, PER TON.

Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 10 0	2 14 0	3 0 0	4 0 0	4 5 0
1½ and 2 inches Socket-Pipes	7 15 0	7 0 0	7 5 0	7 10 0	7 5 0
2½ and 3 " "	7 5 0	6 15 0	7 0 0	7 5 0	7 0 0
4 and 5 " "	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0
3 in. and upwards "	7 0 0	6 5 0	6 5 0	6 15 0	6 5 0
Retorts, 1st fusion, hot blast	6 15 0	...	6 15 0	7 0 0	6 15 0
" 2nd " cold "	7 15 0	...	7 0 0	7 5 0	7 0 0
Tank Plates, ⅜ thick and above	7 5 0	6 10 0	6 15 0	7 0 0	6 15 0

WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1¼ in.	1½ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
" " " 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
Crosses, wrought or cast	4 6	3 0	2 6	2 0	1 6	1 2
Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
" with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
Diminishing Sockets, Caps, Plugs, and Plain Sockets [Nipples	1 3	0 9	0 8	0 6	0 5	0 4
Syphons, 2 quart	1 0	0 8	0 7	0 5	0 4	0 3
	15 0	14 0	13 6	13 0	12 0	—

COALS, PER TON.

Newcastle.—Unscreened.		*Scotch Cannel.*	
Whitwell Primrose	6s. 3d.	Boghead, at Leith	32s. 0d.
Medomsley, Eighton Moor, and Burnhope	6 6	Kirkness, best	23 0
Pelaw	6 9	Capeldrae, 1st quality	20 0
New Pelton, Peareth, South Pelaw, Washington Hutton, and South Peareth	7 0	" 2nd "	12 6
Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	" " Leith	27 6
		Arniston	22 0
		Wemyss	20 0
		Knightswood	18 0
		Pirnie	15 0

SUNDRIES.

Best Newcastle Fire-bricks	per 1000	60s.	0d.
" clay	per ton	12	0
Cliff's Fire-bricks, at Wortley	per 1000	57	6
Ingham's Fire-bricks, at Wortley	"	55	0
Tough Cake Copper	per ton	£98	0s.
English Pig Lead	"	21	10
Welch Bar Iron, in London	"	7	0
Tarred Rope Yarn	per cwt.	26s.	0d.
Foreign Spelter	per ton	£23	15s.
English Block Tin	"	118	0
Banca	"	115	0

FREIGHTS.

Coastwise—Newcastle.—Per Ton.		*Foreign.—Per Keel.*	
Chatham & Rochester	5s. 3d.	Boulogne & Calais	£ 7 0s.
Cork	7 6	Barcelona	22 0
Dover	5s. 6d. to 5 9	Bordeaux	13 0
Dublin	8 0	Cadiz	£15 10s. to 16 0
Exeter Quay	7 6	Copenhagen	7 10
Folkestone	5s. 6d. to 5 9	Dieppe	7 10
Hastings	—	Genoa	20 10
London	5s. 3d. to 5 6	Hamburg	7 15
Lowestoft & Yarmouth	4 0	Havre	8 10
Lynn	4 6	Leghorn	19 0
Portsmouth	6 6	Lisbon	£14 to 14 10
Plymouth	7 0	Rotterdam	£7 to 7 10
Whitstable	5 6	Stettin	9 10
Weymouth	7 6	Trieste & Venice	£20 to 22 10

THE SOUTH BOGHEAD MINES AT KIMMERIDGE.—On Thursday, the 16th of September, the town of Wareham was honoured with a passing visit from the Duc de Malakhoff, who was accompanied by his aide-de-camp, Baron Gudin, and Mr. Kennard. The Marshal left London with the object of visiting the mines of bituminous shale lately put in operation on the coast of Kimmeridge, Dorsetshire. The distinguished party arrived at their destination about 4 p.m., and, after inspecting the subterranean workings, which were illuminated for the occasion, and admiring the elegant and newly-erected construction—the wrought-iron pier—they proceeded to Kimmeridge Bay, where a stone pier is in course of erection. The interest taken in these works cannot be wondered at when the extraordinary properties of the bituminous shale are taken into consideration. So manifold are its applications, that, besides producing the finest candles yet known, and yielding a gas of great illuminating power, experiments and analyses show that it is most valuable as a manure. On distillation it yields a variety of oils, and by a certain simple process the residue can be manufactured into an hydraulic cement. The property is leased to Messrs. Wanostrocht, Knab, and Co., Colonel Mansel, C.B., being the lord of the manor. In the evening the Marshal and party dined at the seat of Colonel Mansel and afterwards proceeded to Swanage, and on the following morning left for London by an early train.

ESSAY ON COAL, BY AN OXFORD EXAMINATION CANDIDATE.—The following paper on "Coal" was delivered by one of the candidates to the examiners at Cheltenham:—"Coal is a black mineral. The way they produce it is this:—First they dig a large pit in the earth. Then they cut down a quantity of timber, and put it in the pit, and cover the whole with peat. Then they burn the timber. After it has been burnt once it becomes charcoal, and out of the charcoal they make oxygen gas, with which we light our streets and houses."—*Staffordshire Advertiser.*

RATING OF THE LONDON DOCKS.—At the Thames Court, on Thursday, Mr. John Taylor, of Albion Grove, Islington, attended to enter recognisances to prosecute an appeal against a rate made by the churchwardens, &c., of St. George's-in-the-East, on the docks, basins, and buildings of the London Dock Company.—It appears that the parochial authorities have recently increased the assessment of the London Dock Company from £17,000 to £70,000. The dock company maintain that they are not rated according to the benefits derived, and have been already successful in a very expensive litigation with the parish in the Court of Chancery. The parochial authorities, however, have resolved upon increasing the lighting and paving rate from £17,000 to £70,000, at which amount the dock company is assessed upon the poor-rate. The increased rating will involve a loss to the dock company of upwards of £5000 per annum, unless the new assessment is quashed by the Quarter Sessions. The dock company have given notice of their intention to appeal against the rate; and Mr. Taylor now attended to enter into sureties to prosecute the appeal.—The sureties were accordingly entered into.

Advertisements.

By Royal Letters Patent.

KAY'S Patent Equitable Gas-Meter is the most effective preventive of fraud by "tilting," and is as simple in construction as the common meter.

Manufactured only by
W. COWAN,
60, BUCCLEUCH STREET,
EDINBURGH.

CEMENT.

G. and T. EARLE, Hull, beg to draw the attention of Gas and Water Companies, Engineers, and Contractors, to their Light Cement, fo Stuccoing and Building Gasholder Tanks, and Jointing Iron Pipes, for which purposes it will be found a very superior article.

BRYAN DONKIN and CO.'s improved GAS VALVES have been adopted by numerous Gas Companies in England and abroad, and their advantages and great security fully proved. Very large numbers are in use. Prices from 11s. 6d. to 13s. 6d. per inch diameter.

BRYAN DONKIN and Co.,
Engineers, near Grange Road, BERMONDSEY.

GEORGE ANDERSON, Gas and CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).

DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

ROBERT MACLAREN and CO.,
EGLINTON FOUNDRY, GLASGOW,
Manufacturers of all sizes of Cast-Iron Main Pipes, by an improved Patent. General Ironfounders, Gas Engineers, and Wrought-Iron Tube Makers.

M. SHEEN, Gas and Railway Lantern Maker, 90½, Holborn Hill, begs to inform Managers of Gas-Works, &c., that she continues to contract and supply Lanterns on reasonable terms, and keep them in repair by the year.

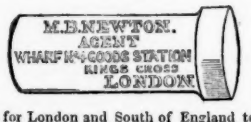
ADDISON POTTER,
WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

GAS-WORKS ERECTED, ALTERED, VALUED, OR LEASED, BY

GEORGE WALCOTT, Gas and CONSULTING ENGINEER,
BEAUMARIS GAS-WORKS, ANGLESEA,
who has erected twenty Gas-Works during the last four years, all of which are giving satisfaction.
London Office, 24, Abchurch Lane, CITY.

J. JONES, Iron Merchant, 6, Bank- SIDE, has long been known to sell the following Castings at prices lower than any other house in London:—Socket and Flange Pipes, Bends, Branches and Tees, Syphons, Lamp-posts, Rain-water Pipes, &c.; also, Hot Water Pipes, Elbows, Tees, Cylindrical and Saddle Boilers, and every Fitting for the same. Drawings and Prices of the above on application to J. JONES, Iron Bridge Wharf, 6, BANKSIDE, near the Southwark Iron Bridge.

J. CLIFF'S Fire Bricks, Clay RETORTS, &c.



Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 13, Westbourne Terrace, BARNSBURY PARK (N.).

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

HARRIS and PEARSON,
PROPRIETORS OF
BEST CLASS-HOUSE POT AND CRUCIBLE CLAY.
MANUFACTURERS OF
FIRE BRICKS GAS RETORTS &C.
AMBLECOTE FIRE CLAY AND BRICK WORKS,
STOURBRIDGE.
Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

JOHN BENT, Manufacturer of GAS-METERS,
283, BELL BARN ROAD, BIRMINGHAM,
(Established 1830),
Begs respectfully to call the attention of Gas Companies, Engineers, &c., to his WET GAS METER, made upon the most improved principles, the most admirable materials, and warranted to register correctly.

BENJAMIN GIBBONS, Jun., DEEPDALE FIRE-CLAY & BRICK WORKS,
Near DUDLEY,
Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

FIRE-CLAY RETORTS,
TO MODEL OR DRAWING.
B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.
References given, if required.

GEORGE CUTLER, Gasholder MAKER,
No. 8, WENLOCK-ROAD, CITY-ROAD, LONDON.
Contracts for Tanks, Gasholders, Roofs, Purifiers, and all descriptions of Gas Apparatus executed on the most reasonable terms. Improved Slide Valves, Steam, and Range Boilers, and Smiths' Work, of the best materials and workmanship.

JOHN ROGERSON and CO., NEWCASTLE-ON-TYNE & MIDDLESBRO'-ON-TEES.
Wrought and Cast Iron Pipes, Cast-Iron Retorts, and all kinds of Foundry Work necessary for Gas-Works. Fire-Bricks and Clay Retorts. Gas Coals of every description. Pig, Bar, and Plate Iron.

WALTER MABON, Engineer, ARDWICK IRON WORKS, FAIRFIELD STREET, MANCHESTER,
Manufacturer of
IRON TANKS for Gasholders, Railway Stations, &c.
GASHOLDERS.—Extensive premises at Gorton, solely for the manufacture of Gasholders, and other heavy Wrought-Iron Structures.
GAS APPARATUS.—W. M. has an extensive assortment of patterns for Purifiers from 4 feet to 15 feet square, also round ones from 4 feet to 10 feet diameter; Scrubbers, Condensers, Washers, Columns, Girders, and Tripod Patterns, suitable for Gasholders, from 10 feet to 150 feet diameter, either Single-lift or Telescope. Contractor for Gas Works of any Magnitude. Designs, Specifications, and Estimates furnished.
WROUGHT and CAST IRON ROOFS for Railway Stations, Gas Works, Warehouses, and Sheds, prepared for Slates or for Corrugated Iron.
IRON HOUSES, either for Dwellings, Manufactories, or Public Buildings.
PIPES and VALVES, for Gas and Water, from 2 inches to 48 inches bore.

By Her Majesty's Royal Letters Patent.

JOSEPH BOULTON, Patent Dry GAS-METER MANUFACTURER, and also Maker of his Improved WATER METERS.
No. 28, BAGNIGGE-WELLS ROAD, CLERKENWELL, adjoining the Police Office.—Late of No. 1, Coppice-row, LONDON.
Experimental and Station Meters of any size made to order on the shortest notice.—Governors, Pressure Registers, Gas-cooking Stoves, and every description of Gas Apparatus.

NOW READY,

VOL. VI. of the JOURNAL of GAS LIGHTING, WATER SUPPLY, and SANITARY IMPROVEMENT, for 1857, price 21s., bound in cloth and lettered. A few copies of Vols. II., III., IV., and V. are still on sale.
W. B. KING, 11, Bolt Court, Fleet Street.

ALFRED PENNY, Engineer,
WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.
Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Cold-blast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.
*** Country orders executed with care and despatch.

WEST and GREGSON, Gas-Meter MANUFACTURERS, &c.
UNION STREET, OLDHAM.
Station and Experimental Meters, Gas Pressure Registers, Gauges, Experimental Gasholders, Governors, Slide Valves, &c. &c.
W. and G. would respectfully call the attention of Gas Engineers and Managers to their Station-meters, having made and erected the largest in use at the present time, two of which may be seen at the Stockport and Liverpool Gas Works, on application to the respective Engineers.

PATENT FLEXIBLE GAS TUBING,
VULCANIZED INDIARUBBER HOSE-PIPES,
WASHERS, PACKING, &c.

JAMES LYNE HANCOCK begs to announce a considerable REDUCTION in PRICE of his PATENT VULCANIZED INDIARUBBER TUBING.
VULCANIZED INDIARUBBER AIR-TIGHT BAGS, any size, for Gas Mains, with flexible tubes attached, and fitted with stop-cocks complete.
Manufactory and Warehouse, No. 6, Goswell Road, LONDON (E.C.).

EDWIN DIXON,
WOLVERHAMPTON PATENT WROUGHT-IRON TUBE WORKS,
Originally established in 1833,
Manufacturer of Gas and other Tubes, Fittings, and articles of every description belonging to Gas, Water, or Steam.
E. D. had the honour of receiving the
PRIZE MEDAL
awarded to this Manufacture by the COUNCIL of the GREAT ENGLISH EXHIBITION of 1851; and from the latter date has supplied many towns exclusively with GALVANIZED and other Tubes for Gas and Water, under GOVERNMENT ENGINEERS.

A City, containing 150,000 inhabitants, has recently been entirely supplied with Tubes made at the above-named Works, and several others with populations nearly as great; in fact, the reputation now acquired induces this notice to the public.
Large Stocks generally on hand, averaging from one to three hundred thousand feet.

HYDRAULIC PRESS TUBES,
to resist 6000 lbs. and upwards to the square inch, extensively manufactured.

STOCK DIES and SCREWING TACKLE,
of the best possible description.
Every Tube carefully tested with Hydraulic Pressure before leaving the Works.

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

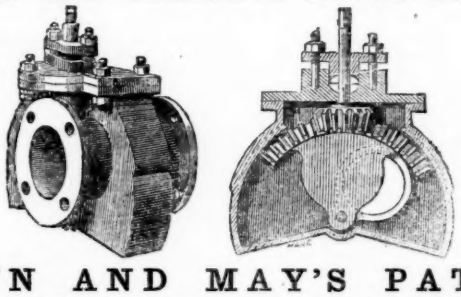
THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C.,
Where a Sample may be seen.

WILLIAM PARKINSON AND CO.,

(Successors to the late Samuel Crosley,)

COTTAGE LANE, CITY ROAD, LONDON,

Beg to announce that, in addition to the manufacture of GAS-METERS, they continue the manufacture of METERS for MEASURING WATER, SPIRITS, &c., commenced, under Patent in 1849, by the late Mr. William Parkinson.

These Meters are as simple and durable as the Gas-Meter, and as correct as that instrument in the registration of the fluids passing through them.

PADDON and FORD, Patent GAS-METER AND APPARATUS WORKS, GRAY'S-INN-ROAD, LONDON,

Manufacturers of WET and DRY GAS METERS, STATION METERS, GOVERNORS, EXPERIMENTAL APPARATUS, LANTERNS, &c. &c.

Contractors for the erection or alteration of Gas-Works; and every description of Apparatus required in Gas-Works supplied.

"ALL DOUBTS REMOVED."

DEFRIES' celebrated Dry Gas-METERS, of which there are 80,000 in use in Palaces, Churches, Chapels, Royal Dock-yards, Club Houses, Public Offices, and other buildings throughout the Empire, the Continent, and Colonies.

His meter for 1500 lights, in use upwards of ten years at the Royal Italian Opera, until that building was destroyed by fire, was long afterwards dug out of the burnt ruins, then tested by the Chartered Gas Company and found inflexibly correct.

On the 9th of June, 1858, at the Western Gas Company, his meter for 150 lights, after considerable use, was doubted, and subjected to the most variable tests, from the full lighting down to a single jet, and in each case, as in numerous other instances, accuracy was finely indicated.

His two large meters at the Thames Tunnel have been in constant use day and night for upwards of twelve years (one continuation of dark hours), subjected to the wear and tear of 75 years, as compared with the ordinary hours of using gaslight above ground.

Gas Companies honouring Mr. Defries with their commands for his PATENT DRY METER, which has done so much service in simplifying the fitting up of gas, as well as checking surreptitious burning, will be guaranteed perfection for five years free of charge.

Defries' Prize-Medal Gas Baths, Gas-Cooking and Heating Stoves. The Polytechnic Gas Fire, with indestructible fuel, in daily operation (Saturday excepted) at the Office, 145, REGENT STREET, and the Manufactory, Euston Road, Fitzroy Square, LONDON.

LIVESEY FIRE-CLAY WORKS,

NEAR BLACKBURN, LANCASHIRE.

ORLANDO BROTHERS,

MANUFACTURER OF PATENT CLAY RETORTS,

AND EVERY DESCRIPTION OF

TUBULAR GLAZED SEWERAGE PIPES, BENDS, JUNCTIONS, ETC.

FIRE-BRICKS, TILES, BLOCKS, AND CHIMNEY-TOPS.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHRISTIE and CO.,—Wharf, 64, Bankside, Southwark, and Offices, 67, King William Street, City; and CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

N.B.—*Export orders continue to have prompt attention.*

ALEXANDER WRIGHT,

GAS ENGINEER, MANUFACTURER OF GAS-METERS, GOVERNORS, AND EVERY DESCRIPTION OF GAS APPARATUS,
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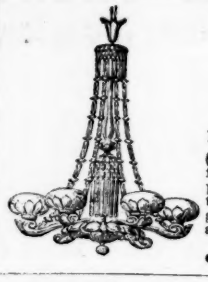
CONSUMERS' METERS at the List Price, with a Liberal Discount to Wholesale Purchasers.
THOMPSON'S BROMINE TEST, £1. 1s.—BROMINE, 3s. per Ounce.
BISULPHURET OF CARBON TEST, £2. 2s.
APPARATUS FOR DETERMINING THE HEATING POWER OF SAMPLES OF COAL AND OTHER DESCRIPTIONS OF FUEL, £5. 5s.,
INVENTED BY LEWIS THOMPSON, ESQ., M.R.C.S.
REGISTERING PRESSURE GAUGE, Net Price, £8. Glass Shade, 10s. extra.
STATION METERS, PRESSURE GAUGES, PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, &C.

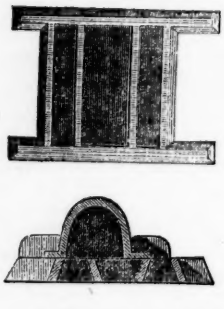
JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD,
CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.
C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.

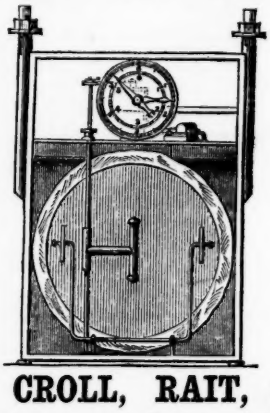


F. & C. OSLER,
44, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upward
(Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of Gas in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

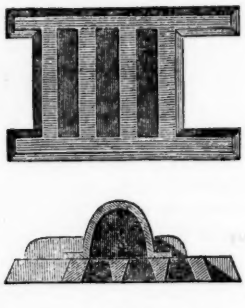
CROLL'S
PATENT IMPROVED DRY GAS-METER,

NEW VALVE.





OLD VALVE.



Manufactured by CROLL, RAIT, and CO., LONDON.
FACTORY—Blundell Street, near the Railway Station, Caledonian Road, N.
OFFICES—10, Coleman Street, City, E.C.

Messrs. CROLL, RAIT, and Co. beg to call the attention of Gas Companies to their Improvements in Dry Gas-Meters, which secure a steady light under all circumstances.

In forming the Valve-Seat of the Dry Gas-Meter it has hitherto been usual for the Bars to be equal in width to the openings; but, by the extent of the surfaces thus brought into contact with the Valve or Cover, it is found that fluid accumulates, and, during part of the motion of the Valve, partially closes the passage, thereby causing an oscillation in the lights.

An Improvement in the Manufacture now introduced and patented by Mr. CROLL consists of very considerably reducing the width of the Surfaces or Bars, as in the drawing of the New Valve, retaining only such width of bar as is necessary to secure correct measurement.

Another Improvement consists in the mode used of mixing and amalgamating the various proportions of Metals for the Valve, always taking care that the Valve-Seat shall be of an alloy considerably different to that of the Valve-Cover, by which the friction of the surfaces is materially lessened.

These Improvements remove at onee any liability to unsteadiness of light, and at the same time secure (from the Valve working more evenly) a greater certainty of accurate registration.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,
PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,
invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.
MANUFACTURERS OF
GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;
DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.
IMPROVED FULL-WAY CARTER'S VALVES (much approved of);
GAS-STOVES, and every article connected with Gas Apparatus.
CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER, TIN, BRASS, & COMPOSITION TUBING.
D. HULETT'S IMPROVED SERVICE CLEANSER
for clearing out Mains, Services, and Interior Fittings—60s. net.
Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.
Sole Manufacturers of Church and Mann's Photometer.
Large Pattern Books, with every description of Gas-Fittings, Chandeliers, &c., with complete Book of Prices, 12s.
Price Book sent free, on receipt of two postage stamps.

London: Printed by WILLIAM BOUGHTON KING (at the office of Joseph Clayton, 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, Sept. 28, 1858.